Examining and Licensing of Architects

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1900

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THE INLAND ARCHITECT AND NEWS RECORD

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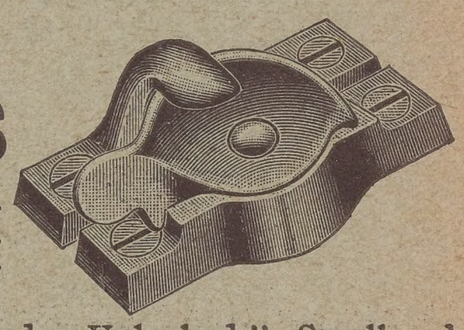

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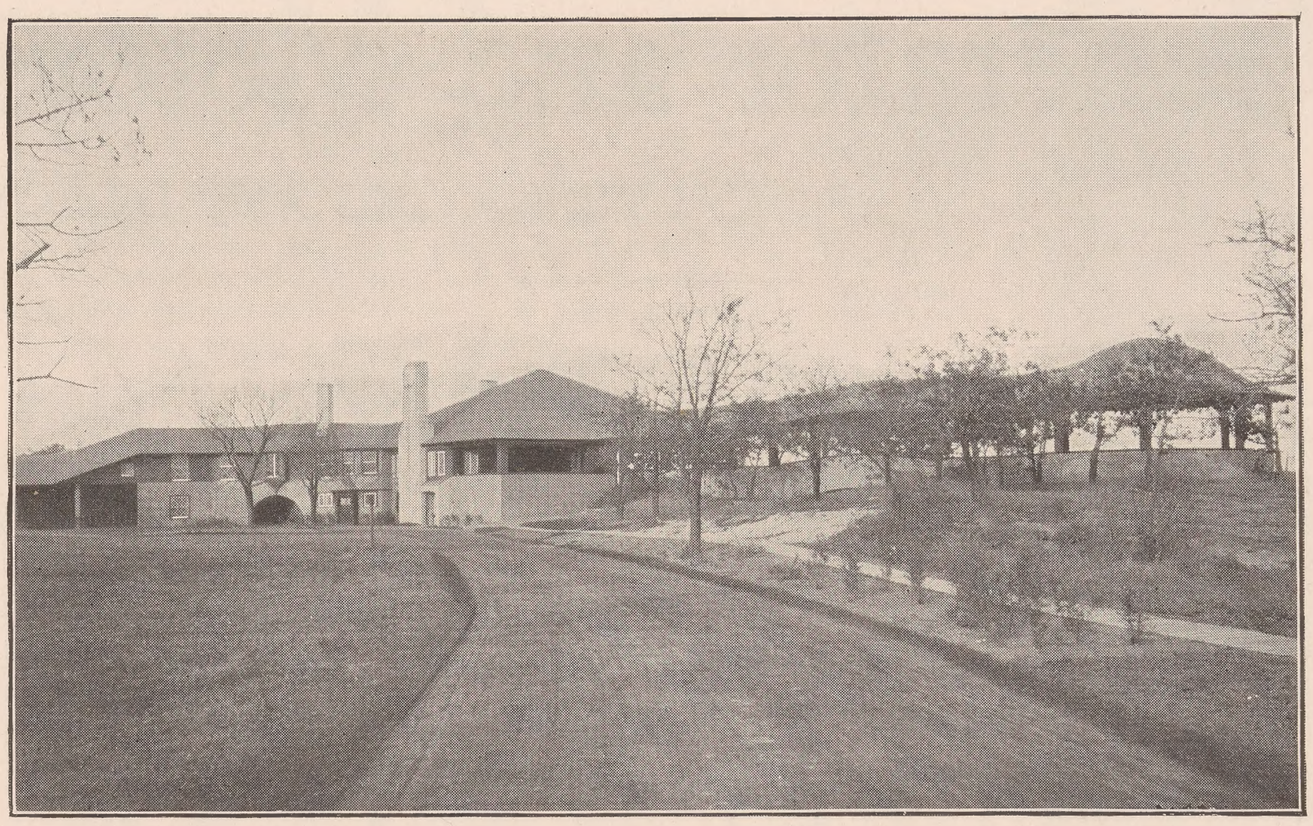

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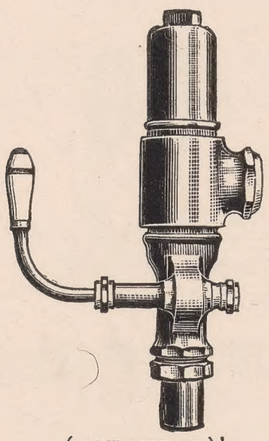

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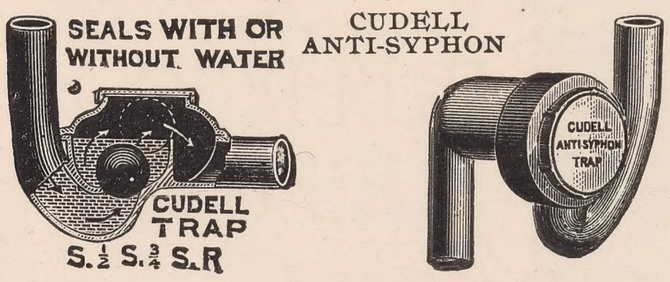

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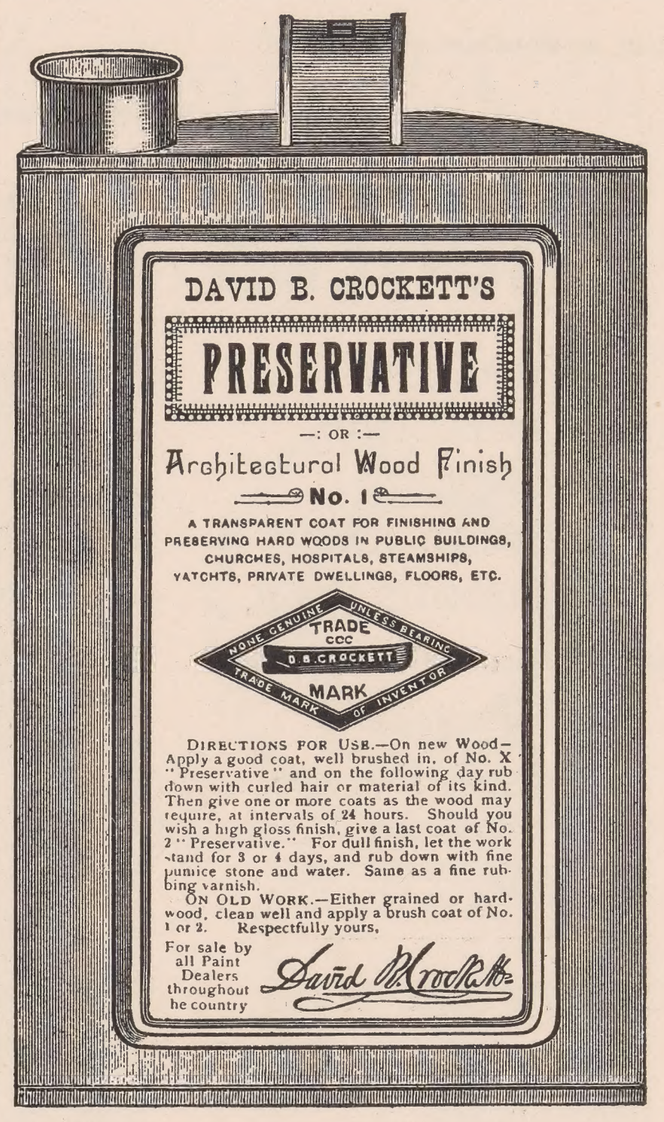
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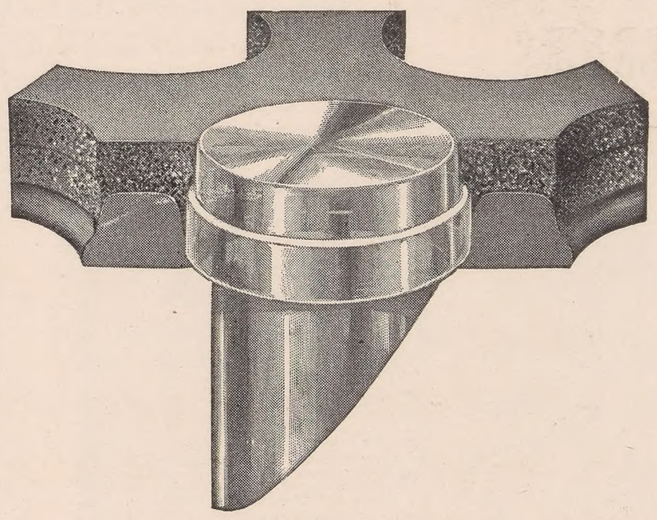

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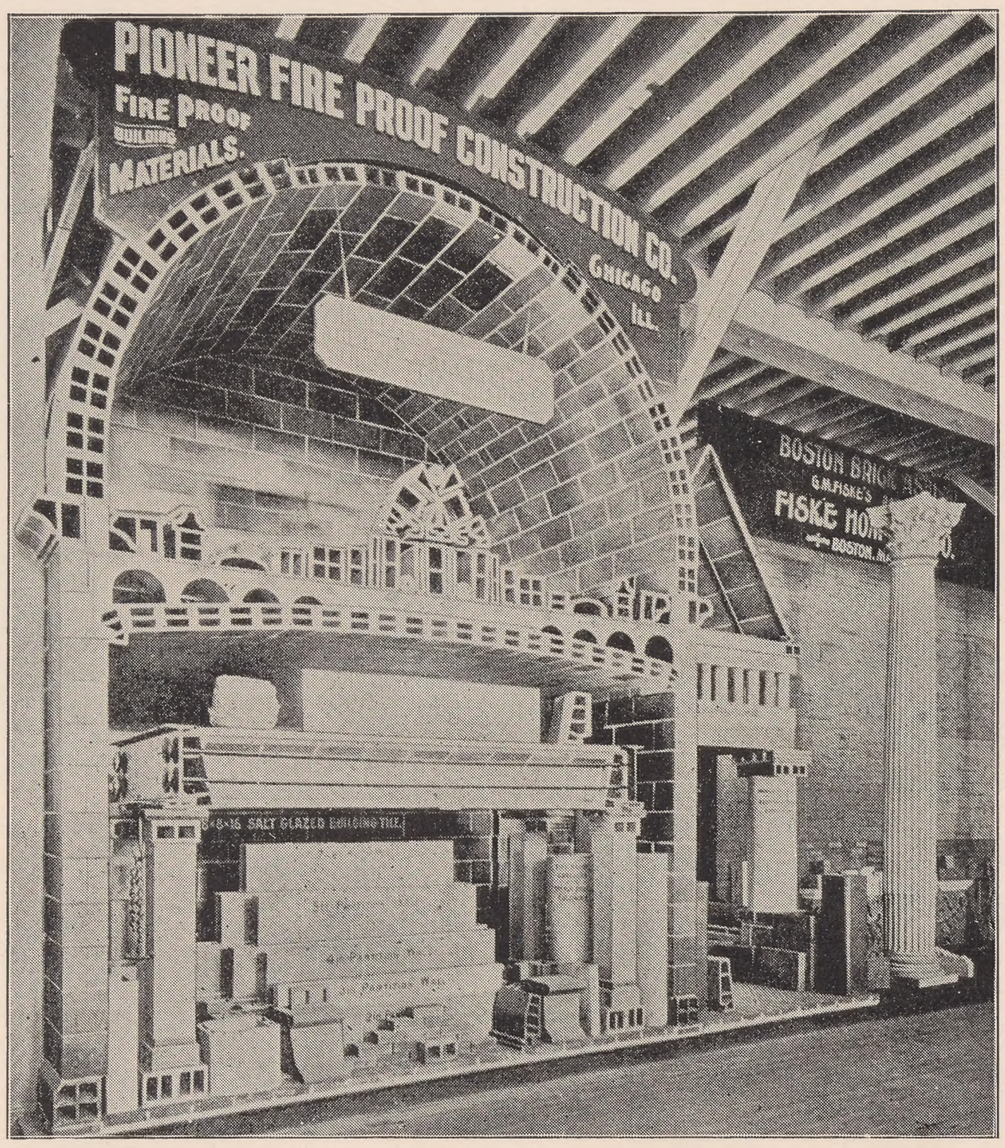

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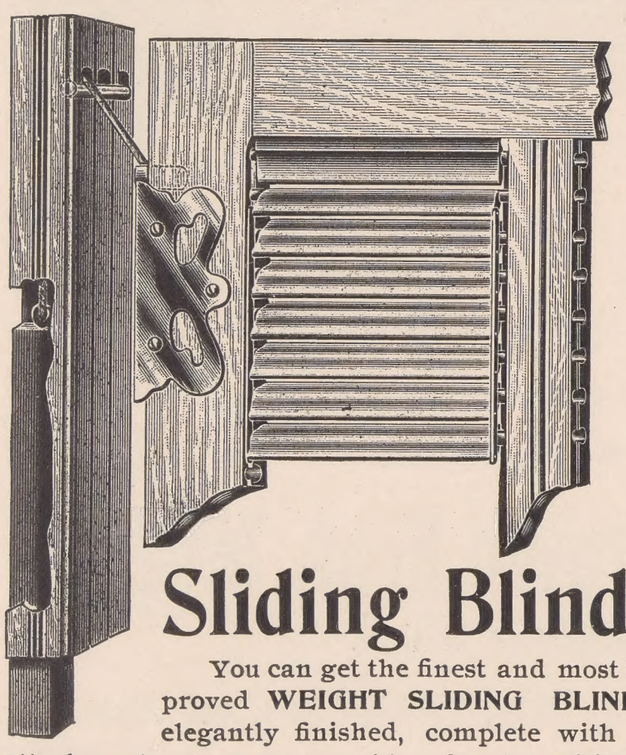

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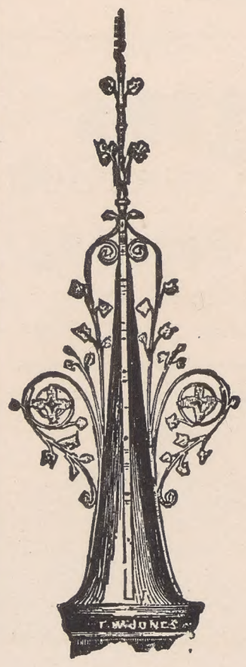

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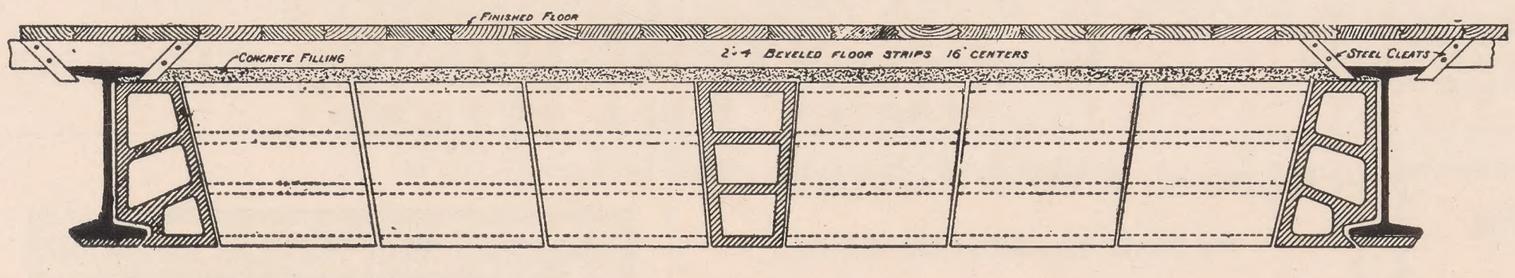

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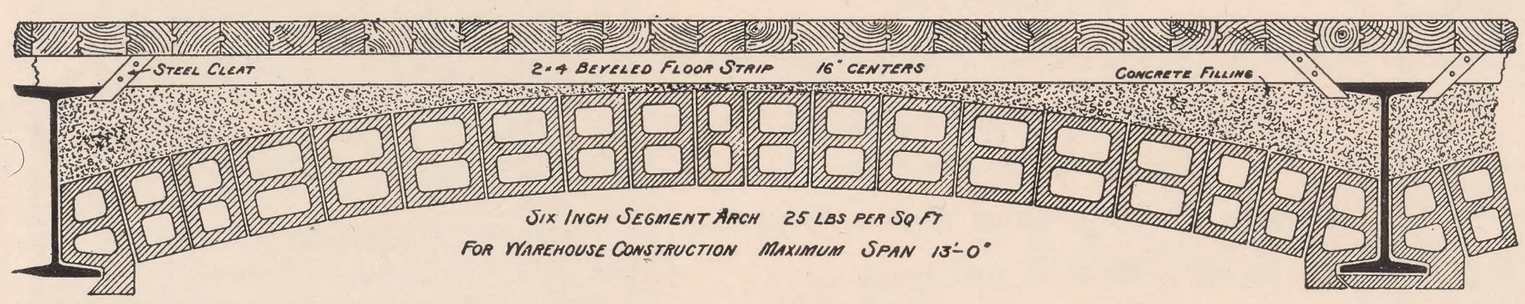
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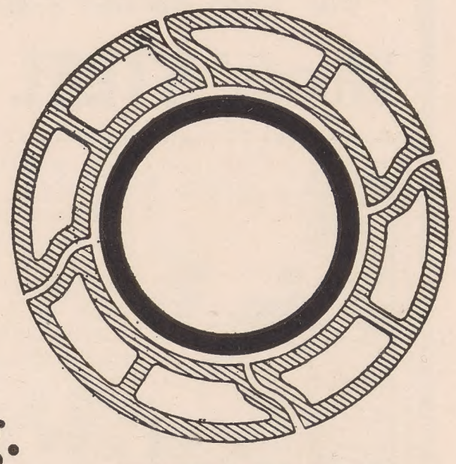

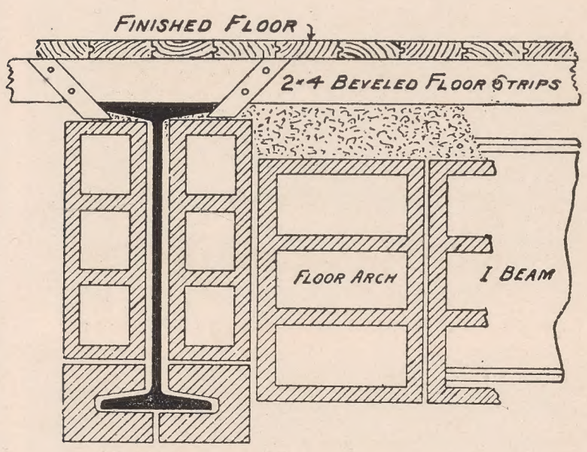

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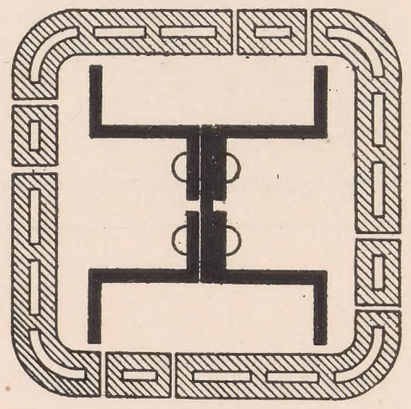

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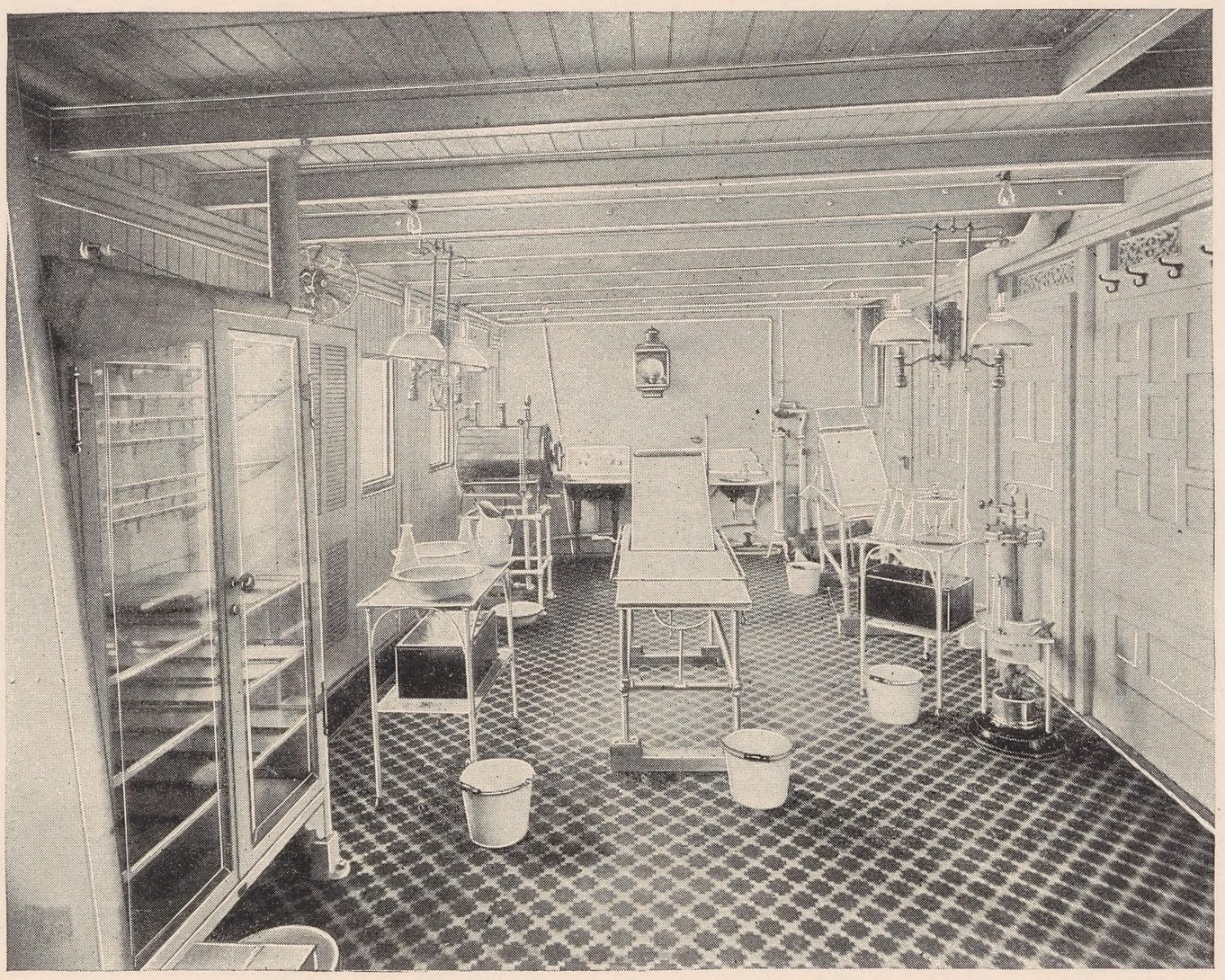

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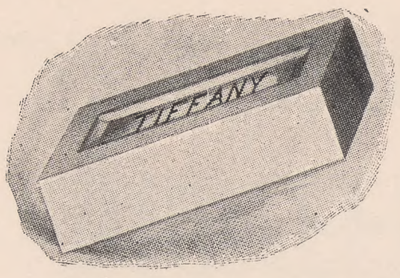

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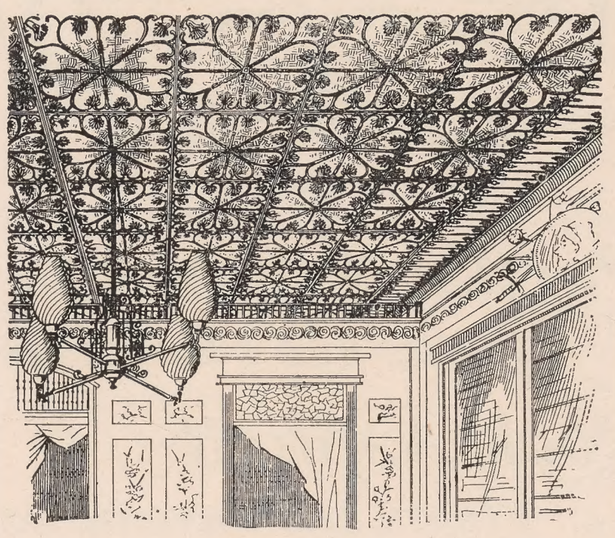

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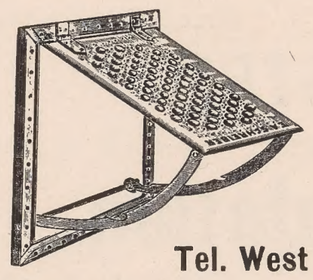

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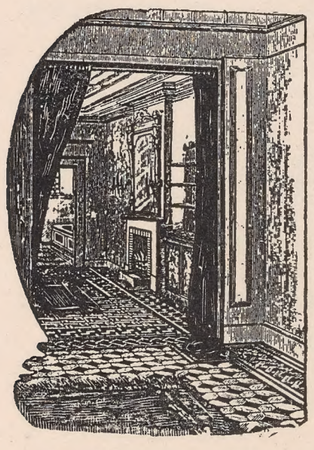

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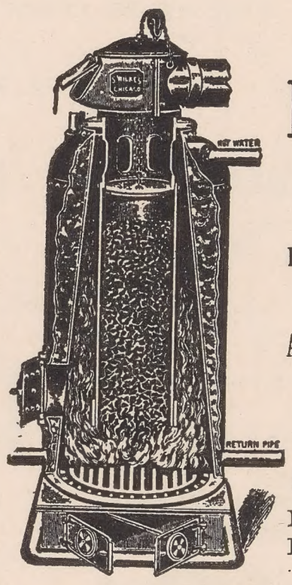

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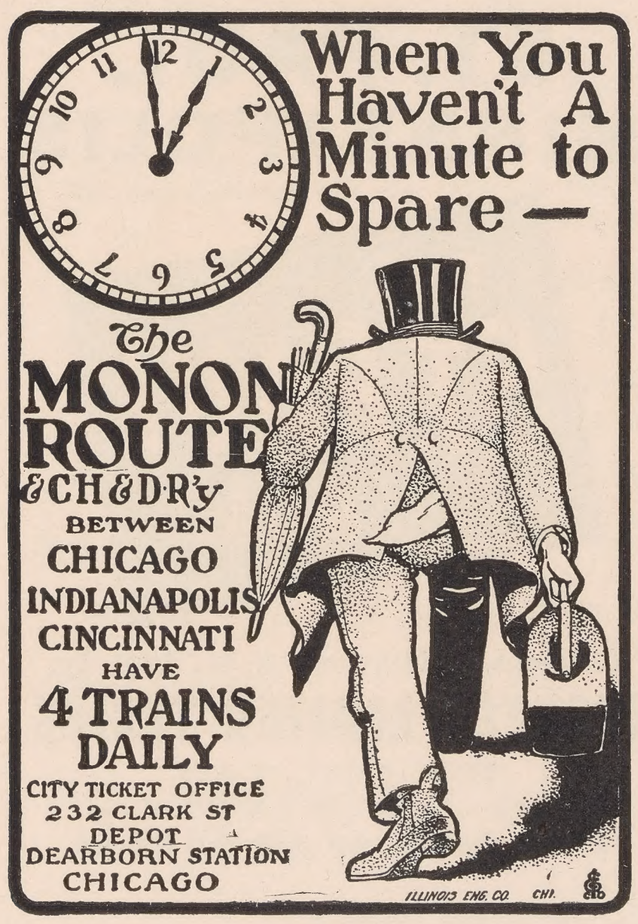

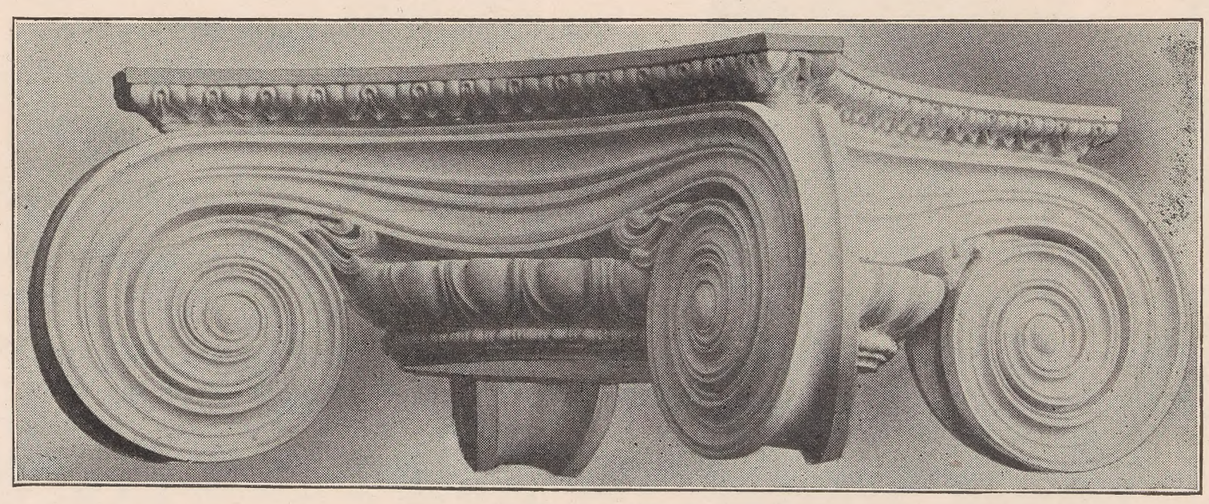

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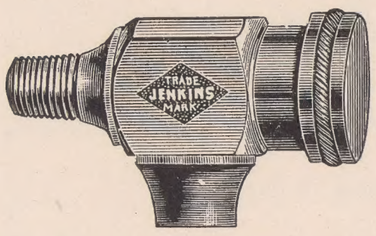

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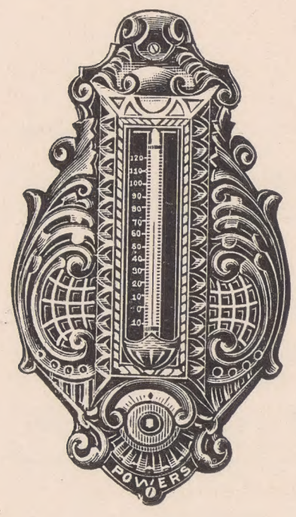

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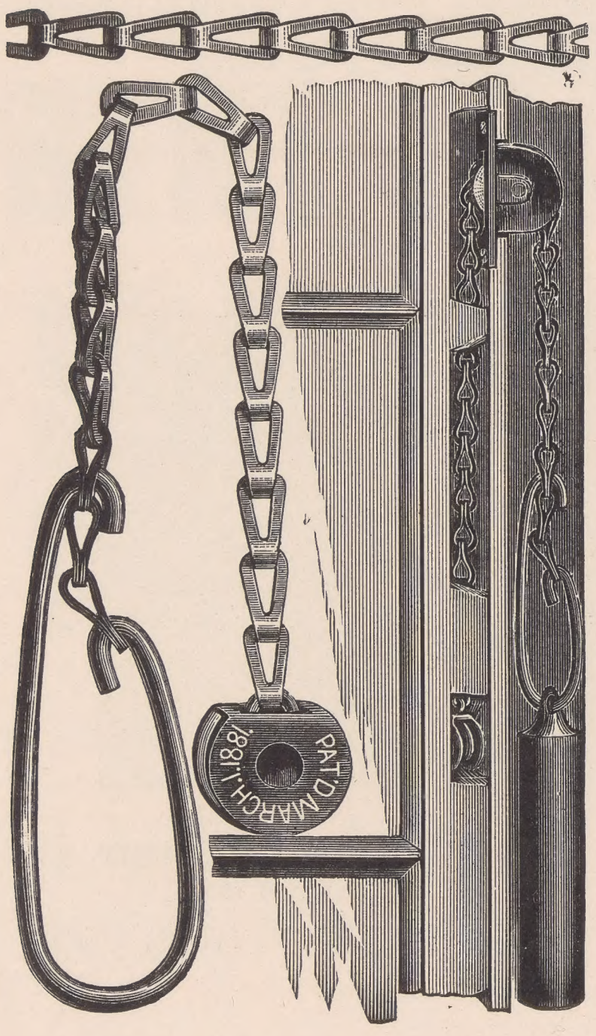

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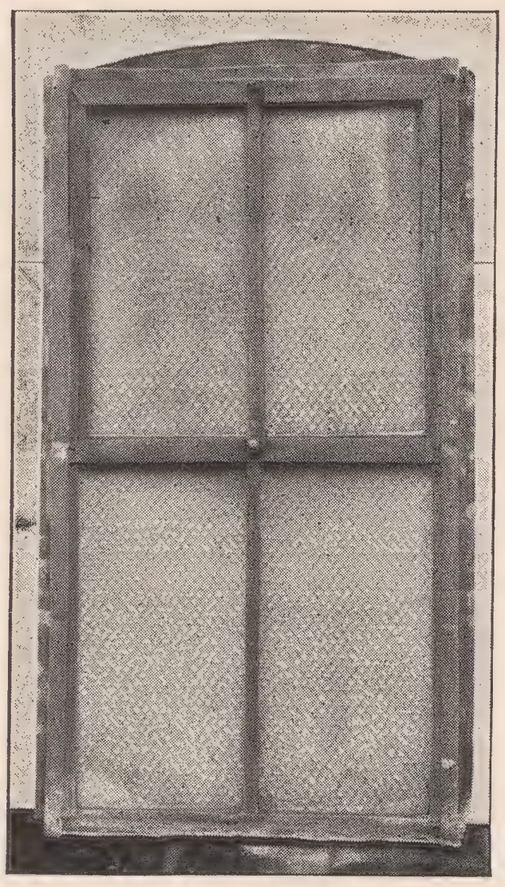

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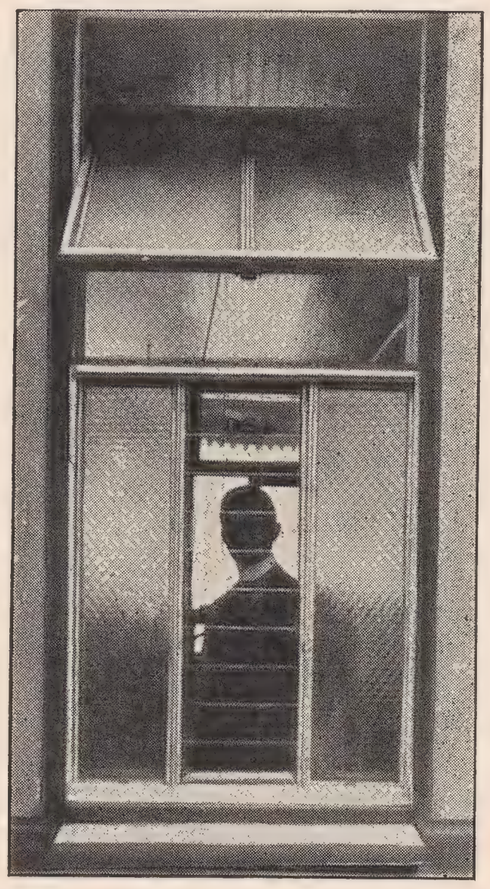

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IN THE WEST.

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Next Convention at Chicago, June 7, 8 and 9, 1900.

Convention Architectural League of America.

The second convention of the Architectural League of America will be held at Chicago on June 7, 8 and 9. This vigorous association of the clubs of the young men in the profession is destined to make its mark in the architectural annals of the times. Like all young and vigorous bodies, its aims are high, and ambitions may in some degree partake of the character of assumption, but their mistakes will prove their greatest successes if they retain the earnestness of thought and singleness of purpose which has so clearly marked their initial work. In its endeavor to promote American architecture and the allied arts, its study of and influence in the advancement of municipal art, it should receive the hearty endorsement of those who have upheld these things in a past that was not so prolific of results but had the same high ideals for its governing principle.

Discussion of a License Law for Architects.

Notwithstanding the discussion of the 1897 convention of the American Institute of Architects upon the advisability of the examining and licensing of architects by State legislation, the results of which were far from conclusive, the matter has again appeared through the opposition to the passage of such a law in Ohio by the Cincinnati Chapter. We, in common with a large proportion of the members of the profession, have always held that the legal action of a State gave the necessary endorsement of the public to the claim that architecture was a profession and not a trade. It does not seem to us that any standard of membership, for instance, of society, unless it comprised all practitioners worthy of the name in its membership, could in any way be deemed a sufficient guarantee that the public would be safe in the employment of an architect unless that standard of proficiency were guaranteed by some recognized authority. Heretofore, the opposition has almost entirely come from the country legislator, but now that a Chapter of recognized prominence has seen fit to oppose legislation in behalf of this law, it may be well for the subject to be again discussed. Nothing should be done that will retard advancement in proficiency, but, on the other hand, everything that will safeguard the public and elevate the standing of the profession as such should be urged by all architects whether they be members of the Institute and its Chapters or not. The belief of the Cincinnati Chapter that the enactment of an examining and licensing law in the State of Ohio would work against the best interests of the American Institute of Architects and defeat its efforts to elevate the profession by raising its standard of membership has led its executive officers to present the opposing view generally among those who are published in the State directory as architects, comprising a total of 219. In return, the Chapter has received 112 letters opposing such legislation, 53 favoring, and the remainder still to be heard from. While there are over seven hundred licensed architects in the State of Illinois, more than one-half of them outside of Chicago, yet the State Chapter never has had more than two or three members outside of that city.

DANKMAR ADLER.*

BY ROBERT CRAIK M'LEAN.

DANKMAR ADLER, architect, died of apoplexy at noon on April 16, 1900. Ten days previous he was stricken, but because of his unusual vitality, his family and friends hoped that he would soon recover from this, the first serious illness of his lifetime.

Mr. Adler was born in Germany, at Langsfeld, Saxe-Weimar, July 3, 1844, and was therefore fifty-six years old. His father, the Rev. Leibman Adler, was a rabbi, and his ancestry as far as he knew had been teachers for many generations. Educated in his early school life in the German schools, he came to America and settled in Detroit, where he continued his studies in the public schools and in the academy at Ann Arbor. In 1859 he began the study of architecture in Detroit with E. Willard Smith, and two years later he came to Chicago with his parents. When the war broke out he enlisted in Battery M, First Illinois, and served from August, 1862, to the close of the Rebellion. Returning to Chicago, after a few months in the office of A. Bower, he was associated with O. S. Kinney, and at the latter's death took charge of the office in connection with A. J. Kinney, a son. In January, 1871, he formed a partnership with Edward Burling, in time to take part in the planning of some of the great buildings that succeeded the fire.

In 1881 the partnership of Adler & Sullivan was formed, and during the period succeeding this the works upon which his reputation as an architect rests were constructed.

Among the many clubs and societies of which Mr. Adler was a member his abilities were always recognized, though in the later years of his life he sought to withdraw from what seemed to him an unnecessary activity in general affairs. When the Western Association of Architects was organized, in 1884, he became its second president, and after the consolidation with the Institute, he served several years as its secretary, which office he finally resigned. He was always a member of some one of its committees or on the board of directors as well as occupying similar offices in his local Chapter and in his favorite clubs. He was for many years a special contributor to The Inland Architect, and his writings for this and other technical journals form some of the most valuable of the contemporaneous literature of the profession.

He was chairman of the Illinois State Board of Examining Architects and to him is due much of the credit for the instant and successful operation of the law in its initial stages. A most important work and one to which he gave largely of his time and experience was the revision of the building laws of the city of Chicago. This practically amounted to a complete compilation of new laws, and while he was not successful in introducing many of the reforms he thought necessary, the important results obtained will be of lasting benefit to the city.

Mr. Adler is survived by his wife, a daughter, two sons—Abraham and Sidney—the former being associated with him in his professional work.

Mr. Adler's place in the annals of the profession was unique. While his reputation as an architect did not rest upon his designs, though he by no means was lacking in designing ability, his work was so incorporated into the execution of the best work of his time that it became a part of his record. Although he never occupied the president's office in the American Institute of Architects, his was the most wise counsel, the most practical plan for procedure, and his advice was always accepted as the highest. As in his professional work he used his extraordinary knowledge of plan and construction and all the mechanical sciences connected with buildings and their fittings without wishing to encroach upon the peculiar province of his partner, so in the Institute he was content to work for the good of the profession and avoided that office which he considered an honor fit only to be held by those much older than he and of greater experience than his. Thus an innate modesty and a disregard for everything that was in any way conspicuous seemed to rule his actions, and having no peculiarities of temperament, his friends in and out of the profession were more numerous than it falls to the lot of many men to possess. This was largely because his actions were always governed by perfect justice and his sympathies were always on the side of the weak rather than the strong, and if his judgment erred it was in some cause where his philanthropy overruled his reason.

Four times in the past ten years has the profession been shocked by the death of one of its members at a time when seemingly his usefulness was at its apex, and this has caused the involuntary question, Why? to rise in the heart and seek in vain for an answer. In Hunt we lost not only our great head, but with him went a force and influence that was always strong in direction of the highest ideals in professional work. Root—that spark of genius that illuminated the horizon of American architecture and gave us a glimpse of what we may become as a profession so that many saw the way to a higher and better art, and then was gone. Carlin—whose mind was analytical and logical, whose work would have been hidden but for the results that will come in better ethics, better laws and a stronger and better union—he passed also at the commencement of a career. And now the name of Adler is added to the roll of losses. For they are losses even as Phidias was a loss to Greece, though even now his influence is felt so that even the portico of the hamlet, church or the wayside cottage may in some feature of its simplicity show an echo of his work in that far-off time. Adler's work is of this nature, though not its form. Will not the government buildings of a hundred years hence be influenced by the laws he labored to have established for the control of their designs? Will not the traditions of his work in the building laws of his city or the professional regulations of his State always influence those who follow for all time? His belief in the ultimate stability of pile foundations, his wide study of acoustics and the construction of public assemblage halls will long influence those who follow, and his ever-active desire to aid his fellow-man has in no small degree raised individual members of the profession from mediocrity to the execution of stable and commendable work. It is probable that in this latter occupation Mr. Adler found his greatest satisfaction. He "made two blades of grass grow where one grew before," with a better grace, with a purer motive than is often found in the ranks of the plain business men in everyday life. For he was largely a plain business man, without enthusiasm for idealic conditions, without a cultivated belief that the world would be better in a day if the right effort was made for its correction, but with a desire to do all that a man might do in the direction dictated by logic and aided by practical example to advance the world's work through doing his own work well.

One incident may be used to illustrate the strong claims the members of the profession always had upon him in the advancement of good practice. An architect in a distant city whom he had never met or perhaps heard of, wrote a friend asking that he arrange with Mr. Adler to go over a set of drawings for a theater, this being his first essay in auditorium planning, a field in which Mr. Adler was perhaps the highest authority of his time. The friend wrote that Mr. Adler would be pleased to do what he requested, intending to arrange the matter later, and he next thought of it when the architect appeared with his plans. They went directly to Mr. Adler's office, who at once thanked his friend for so correctly judging his disposition to accommodate, and he spent the better part of two days in the revision of the plans. When finished, the architect, who was prepared to pay several hundred dollars for the expert service, was told that he owed nothing, as he (Mr. Adler) "might wish to obtain some similar assistance from him some time."

His instincts were all professional, and outside of his family he loved his profession best. When, at a time when his business had become small, his reputation in the profession great and, for reasons entirely outside of his own personal desires, the temptation was exceptionally strong and he was offered a larger sum per year for ten years than he had ever made in any one year in his profession, his first thought—his greatest hesitancy—was because of the necessary abandonment of his profession, and it was mainly through the arguments of his friends that he finally gave way, only to return after six months and again resume his place in its ranks. This love for his profession and belief in its high purposes made his dealings with client or contractor equitable and just, and believing that "competitions" detracted from professional dignity as well as being unbusinesslike and demoralizing, he never entered them under any circumstances.

He was a typical man. He was an affectionate and just father, a citizen that cared enough for his citizenship to follow his country's flag when it required his services, and in civil life to do the work that came to him with his best strength and intellect, and in his profession he paid more attention to the quality of

*With portrait. Memorial border designed by Louis H. Sullivan.

work he gave his client than he did to his bank account. That his untimely death leaves a place that can not be filled is hardly saying too much in reviewing such a life as his by one who was privileged to know him through the twenty years of his greatest activity.

THE EXAMINATION AND LICENSING OF ARCHITECTS.

NOTWITHSTANDING the discussion of the advisability of State laws governing the profession of architecture by an examination and license in the convention of the American Institute of Architects two years ago, the resolutions recently passed by the Cincinnati Chapter against the advocacy of such a law in the State of Ohio and the appointment of a committee by the New York Chapter to urge its passage in New York State, seem to call for some further discussion. That the matter as understood by leading members of the profession may be properly presented, the following articles upon the subject have been prepared. For the State of Ohio the negative is presented by Samuel H. Hannaford, of the Cincinnati Chapter, the affirmative by Robert W. Gibson, president of the New York Chapter. Those who urge the passage of such a law in Ohio are represented by J. W. Yost, of Columbus (recently removed to New York city, but for many years active in the work of procuring such a law in the State), and the effect of the law as in operation for two years in Illinois is described by Peter B. Wight, secretary of the State Board of Examiners of Architects.

ADVISABILITY OF THE PASSAGE OF A LICENSE LAW.

BY SAMUEL HANNAFORD.

The time seems propitious in the minds of many members of our profession that some measure of protection should be afforded the competent and reputable members from the interference of persons who are not architects, or, if so claiming, are not entitled to be so classed because of their incompetency and ignorance of the art; hence, as an easy, and as some believe a sure remedy, they turn to legislative enactments that shall forbid such competition. The members of the Cincinnati Chapter of the American Institute of Architects have suffered from such unfair competition equally with yourselves and earnestly desire a better state of affairs. They have, in company with other members of the profession who are not members of the Institute, carefully considered the subject and earnestly discussed the many reasons advanced by advocates of a license law, and have come to the conclusion that the passage of such a law, which provides for the appointment of an Examining Board by the State, who shall determine the fitness of candidates for the profession, is unwise, not called for by the public, and not to the best interests of the profession.

While perhaps a casual view of the question might lead to an opinion favoring such a law, the Cincinnati Chapter, A. I. A., believe that a more careful examination will result in a different conclusion; hence they desire to submit to your judgment the following thoughts and arguments bearing upon the subject.

In all the discussions of the needs of the profession and the public, the advocates of a license law invariably state that they believe that it will be a great help to the profession and that without it the status of the profession can not be raised or bettered. This statement of an opinion, in which "the wish is father to the thought," is not an argument or a statement that appeals to one's reason, and is fully answered by stating we do not believe that it will be a help to the profession; neither do we think that the status of architecture will be raised or bettered by it.

The only reason advanced in favor of a license law is that it is necessary to protect the public from incompetent practitioners.

In the consideration of this argument, it may be well to state that there are two channels of possible detriment to public interests in this matter: First—Bad construction, that imperils the safety of the public. This is possible, and does sometimes happen, but it rarely happens as the result of lack of knowledge, but generally is directly traceable to rascally work, to work executed by men who are unscrupulous and who are not moved by any considerations of conscientious relation to their work.

Sometimes accidents occur which are disastrous, but these are nearly always due to carelessness and are not the result of ignorance. While admitting the possibility of danger and damage in these instances, we maintain that they are absolutely outside the remedial or preventive scheme proposed in the license law. No examination, be it ever so rigid, can make a dishonest man honest or prevent occasional accidents from occurring.

The second possibility is along the line of bad sanitary conditions. That such bad conditions exist is true, but in justice to the profession we state that in ninety-nine cases in every one hundred they are not chargeable to architects, but that they occur in work done by parties who have not engaged the services of an architect, and their parsimony and ignorance are the offenders. But this necessity of decent living is already covered and provided for by the regulations governing plumbing, etc., in our cities, where most needed, and if existing laws are obeyed and honest men are engaged, honest work will result. If additional protection along this line be needed, the laws at present in force in some parts may readily be extended to embrace the entire State.

In concluding the examination of the validity of the claim that the public should be protected from incompetent service, we maintain that in the past and at present a person desiring the services of an architect can exercise his best judgment in the selection, and is in nowise obligated to put his material interests in jeopardy by engaging the services of any but one whose reputation and character are a guarantee that he will be well served.

We would further suggest to you that, in the case of malpractice, the safeguards of the common law are still in force in all their integrity and we are liable to our employers for any damage they may sustain resulting from lack of skill or carelessness on our part. This common law responsibility of man to man has been in the past, is now, and ever will be the potential protection of the interests of the public.

In conclusion we would remind you that the public have never, at any time or in any place, demanded such protection, and it is not a strained or unfair conclusion to believe that they have never needed it.

In regard to allusions constantly made to the professions of the law and medicine, and drawing a parallel between them and architecture and assuming that the proposed method of the examination and licensing architects is identical with the methods imposed upon law and medicine, we are of the opinion that the parallel does not hold.

First, there is no analogy between the relative familiarity of the doctor and his patient and the architect and his client. For ignorance on the part of a doctor in giving a wrong prescription may result in death, death so swift and sure that it is impossible to prevent it. Hence, so real is this danger that the exercise of the functions of the medical profession have been rightly hedged around by all possible safeguards in every civilized community. Now it is clear to all that the relative position of the architect to the health, the life and the death of his client is not so close as that of the doctor—the very proposition is an absurdity.

The parallelism of the architect and the lawyer to their relative duties are not so marked as that one can be used to illustrate the other. The lawyer must interpret the laws of his country in accordance with fixed principles and forms, and his knowledge of such laws must be determined. He can not be allowed to use them, interpret or apply them according to his own sweet will and fancy. Such looseness would turn every court in the land into a mere pandemonium of sound, idle and windy harangues, equally as destitute of law as of common sense. Hence, an examination of candidates for the legal profession is eminently proper and the law takes cognizance of such.

In addition to the differences in the relative position of architects to their clients and doctors to their patients, which differences vitiate the parallelism desired to be established by advocates of a license law, we would remind you that candidates for the medical profession are not examined by a board appointed by the State as proposed in the law to license architects, but are educated in colleges under the patronage of the several medical bodies of the country, and having passed a satisfactory examination, are given a diploma and are eligible to practice. All that the State does is to require their registration and to show their diplomas as evidence of their fitness.

In this case therefore the profession determines what proficiency is requisite in a candidate—not a State board—and the profession determines their fitness and determines the method and manner of their entry to its domain. Thus the character and fitness of a candidate is determined and the honor and high standing of the profession is maintained. The method of admission to the medical fraternity is within themselves and is absolutely free from any taint of political influences or jobbery, which in spite of denials and even facts to the contrary, would to a great extent nullify the value of a license based upon a State examination.

You are doubtless aware that the subject of the advisability of licensing architects has been before the profession in other countries, as England, France and Germany, for many years, and the subject has been well considered and earnestly debated. The general consensus of opinion has been adverse.

The Royal Institute of British Architects, the largest and by far the most influential representative body in England, has always opposed it. It has always been opposed by the great body of the profession in France and Germany. Indeed, it is a true statement that there is not a civilized country in Europe that has any such license law as that proposed in our State.

It may not be amiss to quote the opinions on record of those eminently qualified to speak on this subject. It is well to note that the underlying selfishness of the movement is as plainly apparent in France as in this country, if we are to judge by the remarks quoted.

Not long since M. Planat, in a contribution to a French journal, discussing the several diplomas granted there, especially in connection with the School of Fine Arts, Paris, says: "The profession of architecture should not be limited even though many practicing architects favor it, because it would be advantageous to them to exclude the greatest possible number of competitors. No one thinks of reducing the number of painters, sculptors and literary men, or even to impose examinations and competitions on the début of their careers; in fact, every profession which is at the service of the public is free.

"There is an exception in the medical profession, but it is

rightfully so, as medicine in the hands of an incompetent man is one of the most dangerous professions. A wrong prescription might result in death, and in this matter the State has only sought to defend the interests of the public and not that of the doctors. Can any one say that the free exercise of architecture is equally a public danger? This would truly be exaggerated. A badly planned building, or badly studied façade, does not necessarily occasion any one's death. There may be a certain inconvenience in employing an unskilled architect, but rarely a grave danger."

This quotation is lengthy, but it shows the drift of the controversy in France. So also M. Mulle, professor of legislation at the Ecole des Beaux-Arts, Paris, in an article discussing the advisability of a license law for architects, and the relative position of lawyers and doctors, for which a diploma was exacted, says:

"It is especially the public interest that is taken into account and not the interest of either profession. Complaints do not come from the public but from the architects, and it is solely in the interest of the profession that this exclusive privilege is demanded."

These two writers go fully to the root of the matter in their opinions that it is the selfishness of the profession that demands this exceptional legislation and not the demand of the public for protection.

In England the passage of a license law has been consistently opposed by the leading minds in the profession, as G. Norman Shaw, Alfred Waterhouse, T. Roger Smith, T. G. Jackson, Ernest Newton and many others, as well as by the Institute of British Architects. Dr. Rowand Anderson, late president of the Edinburgh Architectural Association, in a presidential address, laid down some of the duties of the medical, legal and clerical professions relative to the public, and stated that the public dealt with the architect on a totally different footing. "The architect was but the interpreter of the public idea of art at any given time and had to give what the public wanted and was prepared to pay for. No compulsory law, or diploma, could alter this. The law could not or would not protect the public from bad art, because the public could and must at all times protect itself."

But what can be done to elevate the profession and render it more efficient as a handmaid of our progressive civilization? This question demands our most serious consideration. Not that we think our profession a laggard in the onward and upward march to the starry ideals of the future, but we must be fully furnished and fully equipped for all the demands that may be made upon us. A profession that fails to discern its own future, that is not eager to meet all demands, is lacking in the virility in which the world delights, as an assurance that we are within call and prepared to respond to all the mighty wants and purposes of the future.

One thing is certain, what we may have known and what we now know will not suffice for the future; hence we must by earnest effort prepare for the coming demands.

We need not remind you that the American Institute of Architects—now in its forty-fourth year of usefulness and influence—has prepared a liberal course of study and instituted an examination, and in passing said examination in the future, or upon receiving a diploma from a recognized school of architecture, candidates may become Fellows of the Institute.

That this will result in fitting men for the exercise of all the functions of the profession none can doubt. The Royal Institute of British Architects, of England, inaugurated the same general scheme several years ago, and it has worked admirably. There can be no reasonable doubt of its beneficent effect on the profession, as far as mental fitness and proficiency are concerned, but in addition to this we must exercise the functions of our profession in an honorable and righteous manner among ourselves and in all our relations with the world, and when the decision of an architect is synonymous with equity who can doubt but that the profession will be held in honor and respect. To doubt such a consummation is to deny the very foundation principles of righteous living.

The uplifting of the profession must be in the nature of an evolution from within. A State license is weak and impotent for this purpose, and every effort to attain this desirable end that comes from without will be equally so.

An artisan labors with his hands, labors in the sweat of his brow; the product of his labor is the result of the exercise of brawn and brain, perhaps more of the former than the latter. The object may be useful; it may be or may not be pleasing. When brain—meditation and imagination—dominate the production, which must be an object of beauty, then he who labors is an artist.

The architect must have trained skill and, in addition, be able to call into action faculties that are largely in the realms of the imagination. At the very outset of his consideration of a problem he must have a prophetic vision, so that in his work he can see the end from the beginning. Can you measure this, either in quantity or quality by examination, that you may license its exercise?

For these and many other good and sufficient reasons we are decidedly of the opinion that the passage of a license law is unwise, that if passed it would be inefficient and fail of its intended and desired purpose, and that it is not to the best interests of the profession to restrict its free exercise by the interference of any legislative enactments whatever.

We believe that it should be within the province of the profession itself to determine the measure of fitness and attainment that shall render a candidate eligible to the fellowship of the profession, being confident that through the method inaugurated by the American Institute of Architects the usefulness, honor and dignity of the profession will be advanced and maintained.

THE LICENSE LAW IN THE STATE OF OHIO.

BY J. W. YOST.

There have been three attempts to enact a law in Ohio to establish the profession of architecture—one in 1896, one in 1898, and the other of very recent date. The first two met with no very serious opposition from architects nor elsewhere, and were simply lost because there were other bills on the calendar in which members of the Legislature took more interest. As to what was done with the bill this winter I am not advised, except that it met with considerable opposition from the profession and did not become a law.

Upon the general question as to the necessity or even advisability of enacting such a law there have always been two opinions among the architects in Ohio, but most of the opposition grows not out of opposition to such a law, but to the law as it must be framed to meet legal and public objections in Ohio.

Some of the more influential men among Ohio architects oppose the requiring of any examination or placing any restriction upon the movements of anybody who desires to put out his shingle and call himself an architect. They refer to the past and show how great and successful some have been, and cite the fact that in other older countries it is not customary to have laws of this kind—ignoring, in that connection, the fact that in nearly all of the older countries where architecture of high grade has been produced there have been other laws and regulations which, in an indirect way, accomplished the same purpose. These opposers ignore, also, the fact that the other professions in this country were compelled to establish systems regulating who should and who should not practice before they were able to rise to their present dignity and importance. There would not, however, be a very serious opposition urged against a license law in Ohio if it were not for the form in which such a law must be drawn in order to stand the test of constitutionality and meet the objections of legislators. I mean by this that in Ohio it is claimed that any law which will compel any man to stop business—unless the business itself be unlawful—is not constitutional. Hence a license law must take the practitioners where its enactment finds them—must allow any one now in practice to continue and can act as a preventive only to those who seek to begin after the enactment of the law. The law would therefore serve to give a certificate of character to all persons now engaged in practicing and for the time being would be used as a shield of protection and an advertising dodge by some who are not recognized by the better class of practitioners as being qualified, and these better men add, with a significant swing of the head, "*We* don't need any *label* to establish our *reputation*."

The objection to the recent bill, I am informed, was largely an objection to establishing reputations of ability for those who had not established that kind of a reputation themselves. At first sight this objection seems well grounded. But reforms, wherever and whenever made, must take practical conditions and existing facts into account. Theory must be contempered with practicability or no reform or advance can ever be made. If the establishment of the profession of architecture is a thing to be desired in itself, it can only be done by making temporary sacrifices to the environment. If the law was enacted, the fact that no one could begin who was not well qualified would of its own weight, in less than a decade, drive the unworthy and unqualified out of business. Again, if the law should be enacted, the better men, by mutual consent, could all go before the Board of Examiners and obtain an examiner's certificate, showing their qualifications, while the unqualified could not, so that within constitutional requirements the same practical result could be obtained as though the law required the examination. It would very soon be known who had and who had not an examiner's certificate of qualifications. So that, in fact, it would become impossible for any one with less than reasonable qualifications to *continue* to practice. A few might flourish a license for a time, but they would very soon become known and the public be advised of the facts.

Of course, the older men would not all take kindly to the idea of submitting to an examination, even if they thought it might do good, and some of them doubt if it would. But these men are not the ones whose character is in question. It is so well-established as to be known far and wide without the use of a license or a certificate. So that, against this objection, which is one of temporary inconvenience and short lived in its deleterious influence, there rests the permanent and increasing benefit of all the good for profession and public that can be accomplished by restricting the practice of architecture to those who are worthy and well qualified.

In order to have a law of this kind in Ohio it is necessary that it permit any person who desires to build with his own money to employ any one he pleases to plan his building, whether he be an architect or not. This it is feared by some would enable those who could not get into the profession to practice outside of it, and carry away much work by adopting methods forbidden to regular architects. Some were at first inclined to regard this as

a serious danger in the law, but upon second thought, it would not be worse than it is now and will continue to be if *no* law is passed, while upon the other hand the establishment of the profession upon a regular basis would soon draw a broad line between those who *were* and those who *were not* architects. It would not only elevate the profession by inducing higher qualifications in the architect, but would establish a higher respect in the public mind for the men individually, thus more and more discouraging the practice of employing those who are *not* architects to do architects' work, just as it has become unpopular to employ pettifoggers to do legal business and herb doctors to practice medicine.

It will be admitted, however, that it will always be difficult to get architects who are entirely satisfied with themselves and their surroundings and who do not recognize any duty to the profession at large nor care for what it may be in future generations, to agree to any measure which will require them to move out of the rut into which their course has fallen. It is also difficult to get any one who would favor a license law only if it would drive his competitor out of business, to understand that the greater benefits from such a law are a few years off, and not in the immediate present.

It may be that some awful building disaster in Ohio may be required to wake up the public to the need of such a law or it may be that the aggressions of the *unqualified* may have to become much greater before the more respectable practitioner arouses from his slumber sufficiently to appreciate the real facts in the case.

THE PROPOSED LICENSING OF ARCHITECTS IN NEW YORK.

BY ROBERT W. GIBSON.

The opinion of the architectural profession seems to be, by a strong majority, in favor of some kind of licensing law. It would appear from casual information that members of other professions believe it would be advantageous. Lawyers and physicians who practice under regulation by law think that a profession is elevated and made more useful by that distinction. At the same time, I believe the real effect upon architects would be much less than is claimed by the friends and opponents of the idea. There would be neither such benefits nor such injury as extremists have argued. At first there would be merely a registration of practitioners enrolled by right of their existing privileges, without any regard to their qualifications. This principle has been agreed upon and must be an imperative part of any scheme which hopes to succeed. After the first enrollment, admission will be for merit of a certain grade, so that the annual increase of graduates of the examining boards and decrease of the privileged licensees will result in a gradual arrival at the desired end. In about ten years the examining standard will be felt and its results shown a little, and in about twenty years a full effect may be expected as the process of survival and selection will have worked with it in regard to the privileged members.

But the standard, after all, must be a very modest one. It would be impossible or at least unjust to deny to the architect of a country town, where four-story buildings were the highest required, his right to practice because his science was not cultivated to the degree needed for buildings of ten or twelve stories. The man (or woman) who can with skill and taste design houses of moderate size, and who, being favored with little else, makes this a special occupation, has a right to be called an architect. And there really are many such. It may be said that the principles are the same whether one story or twenty are involved. It sounds plausible, but it is, nevertheless, untrue. In low buildings, the stock sizes of materials and customary thickness of construction, which it is no economy to reduce, supply such a superfluous strength that their quantity is rarely determined by that factor in the problem. And, as we all know, the architect in this class rarely makes a calculation or refers to a table. But in the larger buildings, the materials are used to the limit of safe practice, and in complicated conditions, and an entirely different system prevails, in which science and logic and skill of a high order are imperative for even a safe design, while for economical and artistic excellence certain qualifications are required which no public board could be expected to test satisfactorily.

For these reasons it appears that an examination to be applicable in general would be no guarantee of ability to perform safely any but the simplest work, while it is in the other class of work the graduate would be most desirable.

Nevertheless, I think it is wrong to argue that the license would be utterly useless. It would at any rate prevent, in future, the assumption of the appellation of architect temporarily by persons who, being actively engaged in another occupation (carpentry, for example), call themselves architects to those who want architects, and builders to those who want builders, and anything else when it serves the purpose to deceive. Such of these men of two trades as are qualified, even such as are practicing, will get their certificates and have some greater standing thereby, should aid and not oppose this law, but the lowest standard likely to be adopted would cause a beneficial selection in this stratum at a very early date. Again, the law would have, I do not doubt, a good effect in crystallizing that sentiment of solidarity which the profession lacks. The societies and institutes and leagues fail to do this because their membership number is relatively small. There are so many good practitioners who have no connection with them nor with one another. A law which puts all into one regulation would create a community of interests of great value. I feel sure the Institute and its Chapters would be stimulated greatly by the sentiments and attitude of thought produced.

Then my objection relating to the low standard might be obviated by the adoption of two grades, that of architect being the lower, and architect and engineer, or architect first class, the higher.

In any case the examination should be practical and should stimulate the conditions of actual practice. An applicant should be allowed access during the examination to any reasonable library and the use of any tables, etc., and his way of doing a thing should be left to him, provided it is done rightly and correctly and therefore safely; and in case any art test is required, which I should regret, the standard should be broad and catholic and free from school prejudices, and the subjects should be announced several days in advance, to allow of thought, just as in real life; and there should be no ridiculous limitation to the motive of a short-time sketch. I know of nothing so absurd as this custom in examinations of forbidding the improvement of a design by change of a motive which is stunted in the first conception by unnecessary haste. But it is very doubtful whether any examination in art would be of use. It would be a safer exercise of the governmental power to attempt only the protection of the life and limb of the citizen.

The professional organizations should, when possible, be brought into contact with the executive officers of the law, so as to unify the purposes of both.

On the whole, I believe a law framed in the spirit here advocated would be in the interest of the public as well as of our profession.

OPERATION OF THE LICENSE LAW IN ILLINOIS.

The effect of the license law in Illinois, the only State that has as yet legally recognized architecture as a profession, can best be gathered from an address by the secretary of the Illinois State Board of Examining Architects, Mr. Peter B. Wight, before the annual convention of the Architectural League of America, at Cleveland. The statements there made were those of facts, gathered through closest observation, and in an unofficial way were practically official. After explaining in detail the formation and consequent amendments introduced into the law, Mr. Wight said:

"The matter of the operation of the law is one which I can treat briefly, and that seems to be a subject in the program. I can say unqualifiedly that the operation of the law has been most successful. In the first place, it has been universally accepted by the architects. I know of only two men who were working architects before the law went into effect who refused to take out a license. They came for application blanks but did not fill them out. Neither one has been doing anything since, except in an underhand way, where his name does not appear, which can not be very satisfactory. One out of the seven hundred, who was a man of some political prominence, after the first of January came and asked for an application for examination blank. He didn't say why. He found that all the other architects had applied and he was too late. But he happened to be a man of a great deal of ability and the exhibits which he presented were sufficient for the board to vote upon him, and the board voted to give him an examination license. It was just after we had our first class examination.

"The law has been accepted by the larger majority of intelligent builders. Many who had formerly been making designs are not making designs now. The law has been satisfactory to the clients so far as I know. I never heard any question raised, and the only parties that may perhaps be dissatisfied will be the speculators in the large cities. We hope to run them down very soon. We have the authority and the means to do it. So you see the subject you have given me must be very briefly treated. I hardly know what more to say about the operation of the law than that it has been accepted by everybody very cheerfully, and that it has benefited the profession. It has given architects more self-respect than they ever had before. It enables us to know who is who of the profession. The records that we have and the information that comes to us enable us to know a great deal about the methods and the work of the architects. I have discovered a great deal more hustling than I supposed existed. I have discovered why some architects are peddling their plans and trying to get work. It is because there are too many and there is not enough work to go around. The number of architects in Illinois was probably never greater than just before the World's Fair. After that a great many draftsmen secured little jobs of various kinds, and were in position to apply for a license. They had no special employment. They managed to secure money enough to pay for their license and many of them have been struggling ever since for work, and some have gone back to become draftsmen. At the time this law was passed there were one hundred more men that could claim to do architectural work than there were a year before the World's Fair, and that accounts for the great number who took out these licenses. But these men will drop off forty to fifty every year, and the men who have taken the examinations will be constantly increasing, and there will be an improvement in the character of the men in the profession.

"There is another thing worthy of note. There has not been, so far as I know, a single accident in a building due to carelessness or incompetence on the part of architects since this law was

passed. I don't account for that because they are more skilful, but the law has made these men more careful and circumspect. Many men are incompetent to plan and construct buildings, and they are going to somebody else to help them out. They dread the possibility of losing their license, and that makes them more careful. So far, the main object of the law has been concerning the people. The State of Illinois is securing protection against incompetence and ignorance and recklessness in the construction of buildings. When any one asks me whether the law is effective I say it is, and it is effective from the legal point of view. Questions come to us from architects in States where there is no license law. I can always see a certain phase in them which used to actuate the Illinois men. They want to know if it has been conducive to keeping out the incompetent men so that only able men can have the privilege of making plans. It does not benefit the architects' business in that way, and it will not for a great many years to come. Any man who takes that view of a license law takes a very selfish view of it. He should be more public spirited. He should realize that the intention of this law is to do the public some good. This reflects on them by giving them self-respect, and a man who has self-respect will do less grab business than he has done before.

"These are the results, and, as I think, the benefits of the law. We can easily imagine that twenty years from now there will be scarcely a man practicing under this license who will come under Section 5 of the law. They will have passed examinations. Of course, some may become careless and indifferent, and from time to time examinations may increase, and there is the benefit of giving the board entire authority to use its own judgment. There was the only possibility of objection to the law in that it gave too much discretionary power to the board. I had a conversation with a member of the Senate. He said: 'I like that law, only it gives too much discretionary power to the board.' I told him that if it didn't, the board could not make it effective. He says: 'I know you fellows can be trusted to use your discretion, but I am afraid another crowd may come in.' You must see that the board shall be representative of the men who have the interests of the profession at heart.

"I have been called upon during the last year by architectural associations in six or seven States to help prepare laws which they desire to have passed in their own State. Since they began to come, I talked it over with the other members of the board, and I said that there are many things we would like to have better, but we do not call them imperfections, although they are capable of improvement. This matter of making a misuse of a seal—a crime for which we could try a man—is one of them. There was a very important thing which I have some doubts as to whether it could be legally passed, and that is allowing a man who designs a building and builds it himself to do so without the license fixing a valuation limit on what he can do. We thought we had better suggest that because it will stop the city speculator from doing in a vicious way what we allow the country carpenter to do. We don't want to stop the country carpenter from building farm houses, and I don't believe there is a State in the Union in which you could adopt a law which would prevent a country carpenter from building his neighbor's frame house. So I have put in a clause which limits that privilege to $2,000, because that will cover almost any farm house, and there are not many cases in Illinois where a house is built costing over $2,000 unless they get an architect. These men in small towns are getting the benefit of this law. We have made a copy of the law as it might be amended, and I have supplied these to Missouri and California and Texas and Michigan as models for them to work upon."

EXHIBITION OF THE ST. LOUIS ARCHITECTURAL CLUB FOR 1900.

BY S. L. SHERER.

IF an increased attendance over last year is any indication of a widening interest in architecture, then the members of the St. Louis Architectural Club have reason to feel repaid for the time and labor expended in bringing together the six hundred drawings and examples of work in the allied arts, exhibited at their second annual exhibition at the Museum of Fine Arts from April 12 to 22.

Fortunate in the privilege of holding the exhibition amidst surroundings of such appropriate character, the five galleries presented an attractiveness beyond former years. This was largely due to the intelligent arrangement of the drawings, one gallery being devoted to the work of the various architectural schools, one to architects outside of St. Louis, one to English and French drawings, one to the Phœbe Hearst University of California competitive drawings and miscellaneous work, and the remaining gallery to local work. This arrangement afforded visitors an opportunity for a comparative study of the same problems, and of the work of the various architects, which is extremely difficult when an exhibitor's work is not grouped.

Interest centered in the University of California drawings, and quite naturally, for a more important competition has seldom, if ever, been held. They represent an amount of study and a problem on so vast a scale that one must go back to the golden days of ancient Rome for a standard by which to measure them. Whatever may be the merit of M. Benard's design—and it undoubtedly possesses merit of a very high order—it certainly does not realize one's preconceived ideas of what a great university should be like. At first glance it appears to be some great industrial town or a project for a World's Fair. Although the design of Whitney Warren was not adjudged a prize, we believe it has some advantage in coherence of plan not possessed by the other plans, several of which are a mere congeries of unrelated parts.

For the first time the exhibition had an international character,

due to the interesting collection of English and French drawings—the latter few in number—the principal one being Bernard, Joanny & Roberts' design for the Paris building of the New York Life Insurance Company. As this design received second prize, it would be curious to see the designs which received lower rewards. If this is architecture, let us be thankful that we are not afflicted with it. Bad as our architecture is, it has the merit of not suggesting the work of the confectioner or the milliner, as this design does. What avails technical skill in planning and rendering when not linked with restraint and that indefinable something which is called good taste?

The English work is full of interest and appeals more to American designers, as evidenced by the designs exhibited for country houses. Especially notable is the work of Arnold Mitchell, of London. His drawings for the Colfe Grammar School and a Parish Room at Clapton are well-studied designs in English Gothic, and beautifully rendered in sepia, a medium seldom used in this country. His design for a Municipal Mansion is less satisfactory; the tower has a restlessness common to most modern English towers. Ernest George & Yeats are represented by a drawing of a great baronial hall for Edgeworth Manor—on a scale quite unlike anything in American country houses. The several small houses by Edgar Wood are notable for their unconventionality and the beauty of the drawings, while Walter Crane's sketch of Winchelsea Church shows this versatile artist at his best. C. R. Ashbee's work has the merit of originality, if nothing else, but of a kind that is not likely to find many imitators on this side of the water. Beresford Pite's Sloane medal drawing for a West End Club is "fearfully and wonderfully made," and suggests an illustration for a book of fairy tales rather than a serious architectural composition.

It is manifestly impossible to note all the drawings of merit, and as many of them have received notice elsewhere, we may well leave them for a consideration of the St. Louis work. On the whole, not a very creditable showing, but nevertheless of interest as showing what is being accomplished in St. Louis. The competitive drawings for the new Washington University buildings naturally attracted most attention, but owing to inability to obtain all the designs submitted, only those of Shepley, Rutan & Coolidge-John Lawrence Mauran and Cope & Stewardson were exhibited. The architects first named exhibited a design in the Classic style, and an alternative design in English Gothic—a style that naturally suggests itself for university buildings in an English-speaking country—probably because it approximates to perfection in the colleges at Oxford and Cambridge. The successful architects, Cope & Stewardson, exhibited a block plan, elevations and plans for the Brookings, Busch, Cupples and Liggett halls, in a rather severe adaptation of English Gothic—not quite so interesting as we would expect from these designers; but

as the competition was for the selection of an architect rather than for the adoption of any particular design, we may rest assured that the revised designs will be quite worthy of their reputation.

It is always interesting to note the solution of the same problem by different architects, and as the new building for the St. Louis Trust Company was one of the best opportunities of the year, the competitive drawings of Eames & Young, Theo. C. Link, and Shepley, Rutan & Coolidge-John Lawrence Mauran, attracted much attention. As they were illustrated in the March number of THE INLAND ARCHITECT, it is unnecessary to describe them. The design of the last-named architects was selected and the building is now in course of construction. It is open to adverse criticism in that the short pilasters on the side support the same entablature as the larger columns of the main portal. If the old doctrine that entablatures should be proportioned to the columns which support them means anything, it is difficult to justify such an illogical treatment except on the plea that it "looks well." Aside from this it gives promise of being a dignified and beautiful structure and will be a distinct addition to the bank architecture of St. Louis—a veritable "Temple of the Money Changers." It gains immeasurably by taking the main light from the top, thus giving the side a breadth of wall space that adds much to its dignity.

What E. M. Wheelwright has done for Boston, William B. Ittner is doing for St. Louis, and the photographs of the recently completed Sherman, Eliot and Monroe schools are evidence that a thoroughly competent architect is in charge of the architectural department of the Board of Education. Of a style difficult of classification, but showing a certain Spanish feeling, the design for the Eugene Field School is a distinct advance on the other schools. It is one of the hopeful signs of the time that so much attention is being devoted to educational institutions, and to the part that architecture is playing in their development.

Two buildings which invite comparison because of similarity in size, function and treatment, are the commercial warehouses for Washington University and I. W. Morton, by Eames & Young, and the Lindell building by Shepley, Rutan & Coolidge-John Lawrence Mauran. The side of the latter building is a striking illustration of the lack of attention which characterizes the treatment of the sides and rear of most mercantile buildings, as if architecture was something to be applied only to the front, instand of finding consideration in every part of the structure. The side of the University warehouse has received more consideration, being almost identical in design with the front except for the change in color of the brick: the front and angles of the side being of a mottled brick, while the wall between the angles is of red brick—an experiment of doubtful effect. The vertical division which divides the front marks the party wall of what is

in reality two buildings, and not one, although erected at the same time and in the same style.

A fault which characterizes most of our commercial buildings is the absence of any distinctive entrance, and it is good to see this important feature accentuated in the Eleventh Street Realty Building, by Isaac S. Taylor. It also has the virtue of being built entirely of a brick of one color, and the same treatment accorded the side as the front of the building.

One of the most noteworthy architectural achievements in St. Louis is the twelve or more buildings which constitute the Cupples Station group of warehouses, designed by Eames & Young. The illustration shows some of the buildings erected during the past year, and indicates, we believe, that these designers have brought warehouse design to a point where little improvement is possible. Warehouse No. 6 is of a somewhat earlier date, but practically the same treatment obtains in most of the buildings—triple horizontal divisions; deep reveal to the openings, increased by the projection of the brick architraves; strongly accentuated angles carried uninterrupted to the ground, except for the intervention of a strong string course above the first-story openings; cornices of brick corbeled out much after the manner of the Egyptian gorge. It would seem that almost the last word has been said in warehouse design, for these structures possess that sense of indefinable completeness which all works of architecture should possess. They are architecture in the best sense of the word, and we invite those explorers who are searching the heavens for signs for "an unaffected indigenous style of American Architecture," to turn their telescopes Westward, for in St. Louis they will find a group of buildings in which form follows function, which are thoroughly expressive of their purpose, and which make as little demand upon precedent as it is possible to make.

The residences of John A. Holmes, by Shepley, Rutan & Coolidge and of W. Northrup McMillan, by Eames & Young, are the most notable examples of residence work of the past year. Neither house can claim much on the score of originality—the Holmes house being inspired by the same firm's Blair residence in Chicago, while the McMillan house owes the main features of its façade to a house in Paris; nevertheless the architects have impressed it with their own individuality, with the result that it possesses a distinction that few St. Louis residences can claim. The photograph shows a base lighter in color than the superstructure—a reversal of the more logical treatment which demands that a strong color should support a lighter one. Whether or not the courses of quarry-faced stone in juxtaposition to the rubbed stone is in keeping with the refined treatment of the balance of the house will vary with the personal taste of the observer.

The residence of R. S. Brookings by the same architects is one of the few houses in St. Louis that is imbued with the true Colonial spirit. Built of a mottled orange-colored brick, it has the merit—if it is a merit—of looking a century old. The Graham residence in the same style, is characterized by the refined treatment which we have come to expect from these architects.

Weber & Groves exhibited a design for a ten-story office building, somewhat of a departure from the usual type in that the iron supports of the base—if it can be said to have a base—have been reduced to a minimum, due to the mad desire for "more light"—a commercial necessity perhaps, but surely such treatment will never produce a beautiful building. We take it that a building should not merely possess stability, but look as if it possessed that requirement. It is this lack of repose, so essential to all works of architecture, for which the rampant commercialism of today is largely responsible.

The same architects showed a perspective of the entrance to Flora Boulevard, the central feature of which is strongly suggestive of the Belmont Tomb by Richard M. Hunt. Looked at in perspective it appears exceedingly thin, a fault it does not show in elevation.

M. P. McArdle exhibited a charming water-color for a residence which shows individuality as well as skilful rendering. His design for the Dodds Sanitarium is something of a departure from the beaten path, depending much upon the color scheme and its cornice for the main effect. This is to be picked out in color, with what success remains to be seen.

The several well-studied houses by E. A. Manny show an individuality as pleasing as it is rare in St. Louis residence work. His residence for H. F. Knight shows a clever use of molded brick-work in the cornice, and is withal a very pleasing example of Mr. Manny's style.

Louis Mullgardt exhibited two water-color sketches for the St. Louis Field Club; Louis C. Bulkley a design of W. H. Phelps' house at Carthage; Barnett, Haynes & Barnett an English Gothic design for the new St. Anne's Asylum, and a Colonial residence in Fullerton Place—much after the type of Colonial brick house to be seen in Salem, Massachusetts. Laurence Ewald exhibited a clever design for an English country house in brick and half timber, and W. Albert Swasey a drawing of the Masonic Temple building. Messrs. Arthur Dillon, J. H. Freedlander and Laurence Ewald showed a design for a formal garden for the newly completed St. Louis Club; also a number of photographs of furniture for the same club.

Thomas R. Kimball and Arthur Dillon's competitive design for the Department of Justice building at Washington is a work of fine distinction, and one of the most beautifully rendered drawings in the exhibition. It is open to the criticism that the cornice does not crown the building, but this treatment seems almost inevitable where an order is used in the façade of a building.

John C. Stephens exhibited several clever renderings from photographs of foreign subjects, while Oscar Enders was seen at his best in a masterly drawing of the famous Harvard House at Stratford-on-Avon, one of the few half-timbered houses remaining in the town of William Shakespeare.

Some space was devoted to the allied arts of design in furniture, bookbinding, hardware, leaded glass and Grueby pottery. Unless we except the work of the Dedham Pottery, the Grueby is the most notable pottery thus far produced in America. It is suggestive of the work of the famous Parisian potter, Auguste Deleherche, and both potters, we imagine, owe much to Japanese influence.

R. P. Bringhurst exhibited several models of sculpture and a

photograph of "The Kiss of Immortality," a work of great nobleness, and one that would be considered a work of fine distinction anywhere. To those who have seen the original it suggests French's "Death Staying the Hand of the Sculptor," although it owes nothing to that masterly work unless it be the sentiment. The illustration speaks for itself, which no description could do.

The catalogue deserves mention for the reason that not only has an endeavor been made to invest it with some measure of typographical beauty, but to make it something more than a mere catalogue by adding notes of architectural interest and a résumé of the various styles which have marked the growth of architecture in St. Louis.

On the whole, the exhibition—while not entirely representative of American work—was one of great interest, and can not fail to be of benefit in widening the circle of those who believe that a knowledge of "the finest of the useful arts and the most useful of the fine arts" should be the common property of all.

PAINTS IN ARCHITECTURE.

SMOKE AS A DESTROYER OF PAINT.

TILL within about half a century ago, wood was plentiful and cheap in America and formed a staple fuel. Since that time not only has the character of the fuel changed, but with the increase of comfort and the multiplication of manufacturing industries, the number of smoke-producing fires has been marvelously multiplied.

With the change from wood to coal, the character of the gases given out from the sources of combustion has also changed. The smoke of a wood fire contains no sulphur—the gases from a coal fire always contain sulphur. The same difference obtains between the old tallow candle and coal-oil lamp and the modern gas jet.

Here we have one great and sufficient cause for the common complaint against modern paint as compared with the paint that was found fairly satisfactory by our forefathers. Lead paints are especially susceptible to the attack of sulphur compounds, with which they combine to form the black sulphide of lead. In times when sulphur was a rare ingredient of the atmosphere, this susceptibility was not generally in evidence; but at the present day, when sulphur is breathed forth by every chimney, gas jet and smokestack, it invariably makes its presence known by its effect upon paint.

We can not revolutionize our industries so as to escape the effects of sulphur, but we can so modify our paint formulas as to meet the new conditions. Combination of the basic pigments affords an easy and simple escape. A paint compounded of white lead and zinc white, with or without the addition of inert pigments, is not susceptible to the attacks of sulphur; and even where the under coats are largely composed of pure lead, a final coat of pure zinc will protect the lead for a long time from its darkening action.

CHARLES JOURDAIN.

OUR ILLUSTRATIONS.

Selections from the St. Louis Architectural Club Exhibition of 1900.—Mathews, Upper Clapton, England, New Church Room, Arnold Mitchell, architect, London; Design for the Colfe Grammar School, Lewisham, England, Arnold Mitchell, architect, London. The following work of Eames & Young, Architects, St. Louis: View of Warehouses, Cupples Station, St. Louis; Commercial Warehouses for Washington University and Isaac W. Morton; Commercial Warehouse for Washington University; Warehouse No. 6, Cupples Station, St. Louis; Residence of Robert S. Brookings, St. Louis; Residence of W. N. McMillan, St. Louis. The following work of Architects Shepley, Rutan & Coolidge and John Lawrence Mauran, St. Louis; Commercial Warehouse for Wilbur F. Boyle; Commercial Warehouse for Lindell Real Estate Company; Residence of John A. Holmes, St. Louis. The Kiss of Immortality, Robert P. Bringhurst, sculptor, St. Louis. Eugene Field School, St. Louis; William B. Ittner, architect. Accepted Design for Second Presbyterian Church, St. Louis; Theodore C. Link, architect. Houses on Washington Avenue, St. Louis; E. A. Manny, architect. Eleventh Street Realty Company's Building, St. Louis; Isaac S. Taylor, architect. Entrance to Flora Boulevard, St. Louis; Weber & Groves, architects. Additions to Edgeworth Manor, Gloucester, England; Ernest George & Yeates, architects, London.

Jefferson School Building, Wing & Mahurin, architects, Fort Wayne, Indiana.

Portrait of Dankmar Adler, with Memorial Border designed and rendered by Louis H. Sullivan.

Interior View, Armour Power and Refrigerating Plant, Chicago.

Photogravure Plate: View in Dining-room, Residence of Mrs. S. L. Gillett, Elmira, New York. Pierce & Bickford, architects.

PHOTOGRAVURE PLATES.

Issued only with the Photogravure Edition.

City Hall, Elmira, New York. Pierce & Bickford, architects.

Residence of Mrs. S. L. Gillett, Elmira, New York. Pierce & Bickford, architects.

Residence for Agustus B. Hart, St. Louis, Missouri. Weber & Groves, architects.

Selections from work of Elzmer & Anderson, architects, Cincinnati, Ohio: Two plates, residence exteriors; two plates, residence interiors.

IN MEMORIAM.

DANKMAR ADLER.

The Illinois Chapter of the American Institute of Architects, at its regular monthly meeting, held at the Art Institute, Monday, April 23, 1900:

Wishing to record its sense of loss in the death of Dankmar Adler, one of its members, hereby expresses its profound grief that one of the noblest among men in our chosen profession should so suddenly be removed by an all-wise yet inscrutable Providence.

Possessing a character making for all that is earnest, honest and fearless; of a mind richly endowed and beneficently used; of a personality cordial, generous and kindly, he stood through the years not only an index of those ideals that we cherish, but notably as one living close to them in all sincerity.

Broad in his sympathies and without bias, yet his interests seemed especially to have been centered in the welfare of his professional brethren of the West, and it is to his matured and reliable judgment, his forceful and convincing advocacy, that the profession in the Mississippi Valley is largely indebted for the recognition of its high standing.

His departure, at the comparatively early age of fifty-five, when it would seem, in the natural course of events, that many years of usefulness remained before him, can not fail to impress us with a peculiar sense of shock. Our profession has been much ennobled through his acts of devotion, and in proportional keenness must his loss be felt. As a man, an architect and an exemplary citizen, his memory will remain long cherished by his colleagues.

The Secretary is instructed to record in the books of the Chapter the sentiments above expressed as the unanimous and heartfelt sense of the meeting, and to forward a copy thereof to the bereaved family in token of its respectful sympathy and condolence.

(Signed) SAMUEL A. TREAT, President.
GEORGE BEAUMONT, Secretary.

EXTRACT FROM MINUTES OF A SPECIAL MEETING OF THE STATE BOARD OF EXAMINERS OF ARCHITECTS, HELD APRIL 27, 1900.

The Secretary announced the death of Dankmar Adler, first president of this board, which occurred April 16, from a stroke of apoplexy, after an illness of only a few days, and made the following entry upon the minutes:

Mr. Adler was one of the architects of America whose work and example have done so much to elevate and ennoble the architectural profession, to raise the art of building to a progressive science, and to make architects more respected throughout the world.

He was the first architect to propose and prepare a State law which was intended to give legal status and official recognition to the profession of architecture. This he did twelve years ago, and the draft which he then made, and supported by a paper read before the Illinois State Association of Architects, was the basis of that law under which this Board was organized, and is now acting.

He was the first candidate recommended to the Governor of Illinois by the architects of this State, for appointment on this Board. As its president his decisions were characterized by a conscientious sense of justice and judicial discrimination, which would have been creditable to the bench or bar. The analysis of the architects' license law which was prepared by him in consultation with the Attorney-General of the State, and which was formally endorsed by the latter as his own opinion, to be a guide for the action of this Board is, for clear judicial insight, familiarity with the fundamental principles of law, clearness of expression and beauty of diction, worthy to be ranked among the opinions of our most eminent jurists.

In his personal characteristics kindness and generosity were most prominent. He was always ready to help those in trouble, whether professional or otherwise, with advice and even more substantial aid. Selfishness was an unknown quantity in his make-up. Of his public spirit evidences may be seen in a hundred directions. He filled responsible offices in architectural associations to the sacrifice of many personal interests, and in later life was a prominent and active factor not only in the many Hebrew charities that abound in this city, but wherever his services could be of value.

He has left his impress on the architecture of our time and country, in the many public and private buildings with which his name is associated.

PETER B. WIGHT, Secretary.

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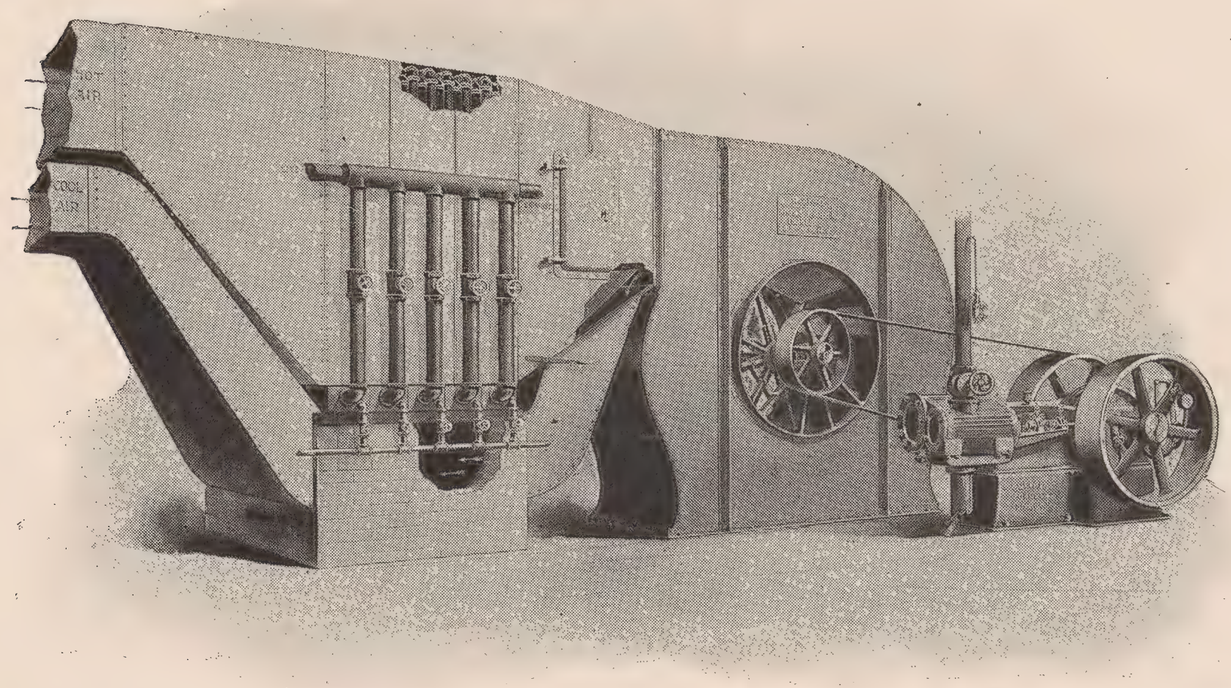

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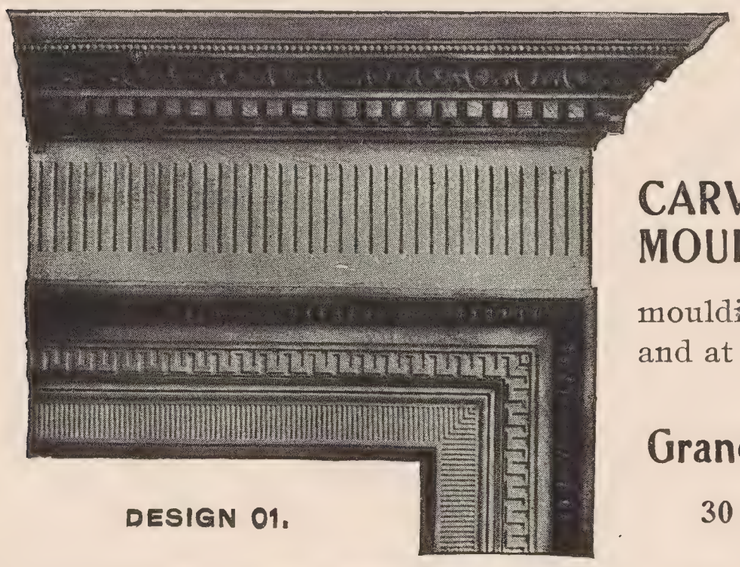

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THE INLAND ARCHITECT AND NEWS RECORD

Vol. XXXV. ADVERTISERS' TRADE SUPPLEMENT. No. 4

Valuable Publications Free.

Any architect can secure valuable books of reference without cost by sending for the catalogues of materials, etc., noticed from month to month in these columns. Large sums are spent on these catalogues, and they contain much practical information. Many are art productions. They may be obtained free on application to those issuing them. In writing please mention THE INLAND ARCHITECT, and oblige the journal and the dealer.

REQUESTS FOR CATALOGUES AND SAMPLES.

Those wishing catalogues and samples sent them by dealers in general may have their names inserted under this heading free of charge. The only recompense desired is that the dealers who send catalogues to these addresses give THE INLAND ARCHITECT due credit for business benefits that result.

ARTHUR J. WILLIAMS, Architect, Oklahoma City, Oklahoma.

BUILDERS' EXCHANGE, 204 St. James St., Montreal, Canada. Ask for catalogues, etc.

ANDREWS & MARTINDALE, Architects, of Indianapolis, have removed their offices to Nos. 32, 33, 34, Blackford Block.

COWLES & EASTMAN, Architects, Calumet, Michigan.

The general offices of the J. RIELY GORDON COMPANY, Architects, have been moved from San Antonio, Texas, to their new building, corner Main and Field streets, Dallas, Texas, where they will be pleased to receive catalogues and samples.

A NEW BOOK ON COLORADO.

We have received from Mr. P. S. Eustis, General Passenger Agent of the Chicago, Burlington & Quincy Railroad, a book just off the press, which is unusually interesting and artistic. It is on the subject of Colorado, fascinatingly written by James W. Steele, a descriptive writer of great force. The book is lavishly illustrated by engravings of a high order, and the printer's art has not been handicapped by an effort to save expense. To anyone interested in the grandeur of Colorado scenery, and particularly to one contemplating a visit to the country described, the book will be indispensable. Copies can be had by sending a letter of request accompanied by 6 cents in postage stamps, to Mr. Eustis at his Chicago address, 209 Adams street.

TRADE NOTES.

I. P. FRINK reports a number of installations of Frink's Patent Store Window Reflector, at Boston, the most important being in the new Gross & Strauss store, at corner of Bedford and Washington streets, the addition to R. H. White & Co., and the store of B. Summers & Co., on Winter street.

THE large block of buildings comprising the stores of Boggs & Buhl, Allegheny, Pennsylvania, have recently had installed a Scaife Water Filter with a capacity of over 125,000 gallons per day. Pure clear water is thereby furnished for the steam boilers, laundry department, as well as for drinking purposes and general use. No chemicals or coagulants of any kinds are used in these filters, which are manufactured by William B. Scaife & Sons, Pittsburg, Pennsylvania.

AN unusual departure in the way of show-window advertising is that of the May Company, Cleveland, which has probably the most remarkable store front in the world. They have utilized the plate-glass front of their building, the whole six stories in height, and have lighted this enormous expanse of window display with Frink's special patent window reflectors, which had been previously used in the stores of this syndicate in St. Louis and Denver. Quite a number of Cleveland stores owe their attractive windows to this system, among them being Kent, Hoyt & Sefton Company, Browning, King & Co., J. G. Meckes, Fries & Schuele and Nathan Skall.

THE Powers Regulator Company have recently secured contracts for the installation of their system of heat regulation in the following buildings: School at Parkersburg, W. Va; High School, Morgan Park, Ill.; W. & W. R. R. Hospital, South Rocky Mount, N. C.; Hurst School, Washington, D. C.; Swift & Co., offices, Union Stock Yards, Chicago; Eighth and Fitzwater Street School, Philadelphia; Park Street School, at Portland, Maine; Real Estate Trust building, Philadelphia; Normal School at Westfield, Mass. Send for catalogue.

THE following letter bears testimony to a worthy industry:

THE LOZIER MANUFACTURING COMPANY,
WESTFIELD, MASS, August 9, 1899.

Buffalo Forge Company, Buffalo, N. Y.:

GENTLEMEN,—In reply to your favor of August 4 to our Cleveland office, will say that the writer has personally equipped all of the Lozier factories at Toledo, Ohio; Westfield, Mass.; Thompsonville, Conn., and Toronto, Ont., with your heating and ventilating plants, and it is needless to say that we are more than pleased with the system at each and every point mentioned. We know of nothing better, the results obtained being perfectly satisfactory.

Yours truly,
THE LOZIER MANUFACTURING COMPANY.
CHARLES J. MOON, Manager.

PERHAPS you have wondered why Berger's Classic Metal Ceilings are so different in appearance from ordinary stamped metal plates of other makers. The general run of metal ceiling plates are stamped from die-sunk models; hence produce more or less of a stiff mechanical effect. Berger's designs, on the contrary, are first modeled in clay, by the deft fingers of an expert, who gives them the artistic finish possible in this plastic material. This model is faithfully reproduced in the die, and their correct method of stamping brings out the detail in bold relief. Thus they retain the characteristic plastic effect of the original model and secure an artistic elegance that would otherwise be unattainable. This is only one of the features that are making Berger's Classic Metal Ceilings famous. Write for Catalogue No. 5 and full particulars to the Berger Manufacturing Company, Canton, Ohio.

IT is, perhaps, not amiss to again call attention to the Decorators' Supply Company, 215 South Clinton street. In their recently issued catalogue they have covered the subject of capital ornamentation in a most complete manner. As a feature of architecture the supporting column, with its capital, is too distinctive to require further comment; and while in the early days the several orders of architecture depended largely upon the capital for their characteristics, it is also true that the selection of a certain capital, regarding its simplicity or more ornate features, was dependent, at least to a certain extent, upon cost. The march of time has given us developments along this line and in many respects the ornamentation by capitals is more of a requisite, for both interior and exterior architectural harmony, than in the olden times. Yet the cost of such ornamentation in these modern days is in an inverse ratio to the demand. The catalogue referred to should be in the hands of all who wish to be fully informed in these matters.

IN connection with the hunting season in Ontario, it might be of interest to mention that the Grand Trunk Railway had their photographer in the wilds of the forests, getting negatives of the best scenes possible, and the result was most gratifying. He secured pictures of the hunter's shack, both interior views and exterior; also some splendid pictures of the results of the chase, as well as several views of herds of wild deer which were taken with a telephoto lens at a distance of a mile away from the object. These pictures have been enlarged from a small 8 by 10-inch negative to a size 21 by 31 inches and the Grand Trunk intends having them on exhibition at its different ticket offices in all the large cities of America. The collection will be well worth seeing, as it is considered that they are the finest series of hunting pictures that have ever been taken with the camera.

WE notice that the Pioneer Fireproofing Company have been encouraged by the outlook to replace the factory burned some two years ago at Ottawa with a handsome modern plant, which Manager Holland rightly thinks stands near the head of the procession in all that makes up an establishment for turning out a maximum quantity of first-class wares in their line at a minimum cost. Abundant water-power, a variety of clays of excellent character, electric haulage of clays, and one of the most tasteful, convenient and well-equipped factories, built from hollow blocks of their own making, and equipped with machinery and dryer of the American Clayworking Machinery Company's build, briefly summarizes the situation. One can hardly look through their Ottawa yard and their Chicago sample room in the Marquette building without feeling that it is a shame that the very beautiful mottled effects, and the bright buffs and pinks, which appear in many of their wares, should be hidden from sight by a plaster coating. We are advised, however, that the company is contemplating the manufacture of a line of terra cotta blocks for outer wall construction as licensees under the Durant system.—*The Clay Worker.*

PROPOSALS WANTED.

TREASURY DEPARTMENT, OFFICE OF SUPERVISING ARCHITECT, Washington, D. C., May 5, 1900.—SEALED PROPOSALS will be received at this office until 2 o'clock P.M., on June 11, 1900, and then opened, for the installation of a wiring system for the United States Mint building, at Philadelphia, Pennsylvania, in accordance with the drawings and specification, copies of which may be obtained at this office or at the office of the Superintendent of Construction, at Philadelphia, Pennsylvania, at the discretion of the Supervising Architect.

JAMES KNOX TAYLOR, Supervising Architect.

Examination for License.

Notice is hereby given to all persons desiring an examination for license to practice the profession of architecture in the State of Illinois under the provision of "An Act to Provide for the Licensing of Architects and Regulating the Practice of Architecture as a Profession" (approved June 3, 1897, and amended April 20, 1899), that applications will be received at all times on the blanks prepared by the Board, with affidavit attached, copies of which will be furnished upon application.

A regular class examination will be held at Engineering Hall, University of Illinois, Urbana, on June 19, 20, and 21 Copies of the law and rules of the Board will be sent by mail on application. Application for this examination must be filed one week before it commences. By order of the Board, PETER B. WIGHT, Secretary.

Massachusetts Institute of Technology

DEPARTMENT OF ARCHITECTURE

Options in **Architectural Engineering** and **Landscape Architecture.**

College graduates and **draftsmen** admitted as special students.

SUMMER COURSES in **Elementary Design** and **Shades and Shadows** will begin July 5.

Proficiency in these subjects will enable draftsmen and students from other colleges to enter third year work, and give them an opportunity to complete the professional subjects in two years.

For catalogues and information, apply to H. W. TYLER, Secretary, Massachusetts Institute of Technology, Boston, Mass.

THE INLAND ARCHITECT AND NEWS RECORD

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OFFICE BUILDINGS:
Architects D. H. Burnham & Co., for Stewart .....Oct.
Architects Essenwein & Johnson, for Mayer & Weill .....Aug.
Architect Charles S. Frost, for Brown ....Sept.
Architects Holabird & Roche, for Hart, Schaffner & Marx..... .....Sept.

OFFICE BUILDING (ENTRANCE):
Architects Green & Wicks, for Mutual Life Company..... .....Aug.

PUBLIC LIBRARY:
Architects Wilker & Kimball, for Omaha.Dec.

RESIDENCES:
At Edgewater..... .....Dec.
Architect R. A. Deuell, for F. J. Smith....Jan.
Architect Charles S. Frost, for C. E. Wilson..... .....Oct.
Architect Myron Hunt, for Mrs. Francis M. Sweet.....Nov.
Architect George W. Maher, architect at Edgewater .....Dec.
Architect George W. Maher, for John Farson... .....Nov.
Architects McKim, Mead & White, at Buffalo .....Aug.
Architect Charles F. Schweinfurth, for J. D. Cox, Jr.....Aug.
Architect Charles Inco Williams, for Scott Jordan .....Dec.
Architect Myron Hunt, for J. W. Sweet...Nov.

RESIDENCES (INTERIORS):
Architect George W. Maher, for John Farson.....Nov.
Architect Charles F. Schweinfurth.....Sept.
Architect Charles F. Schweinfurth, for A. C. Saunders .....Aug.

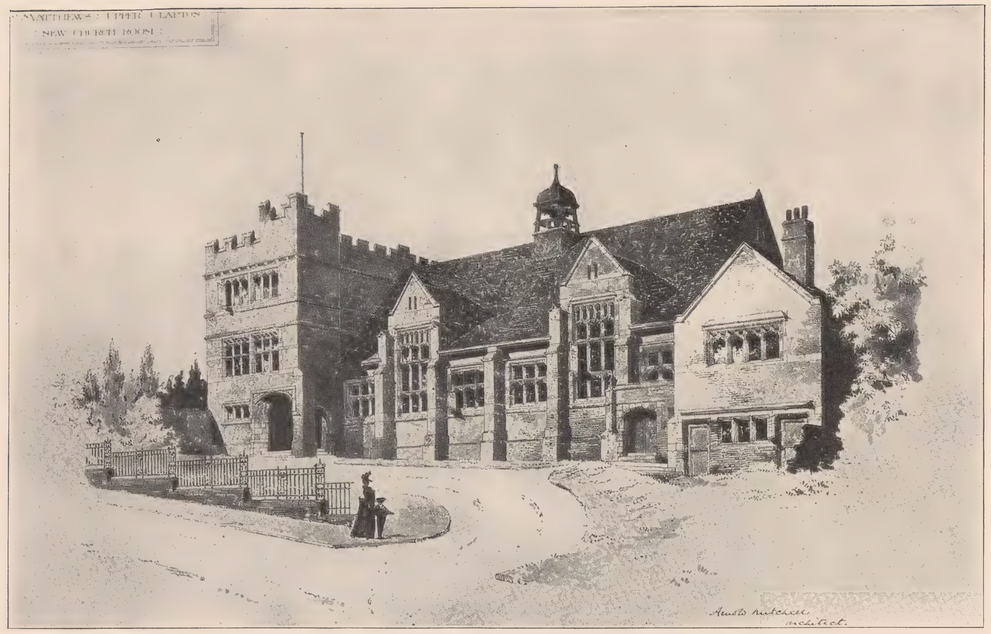
RESTAURANT:
German .....Dec.

SETTLEMENT:
Architects Pond & Pond, for Hull House ..Jan.

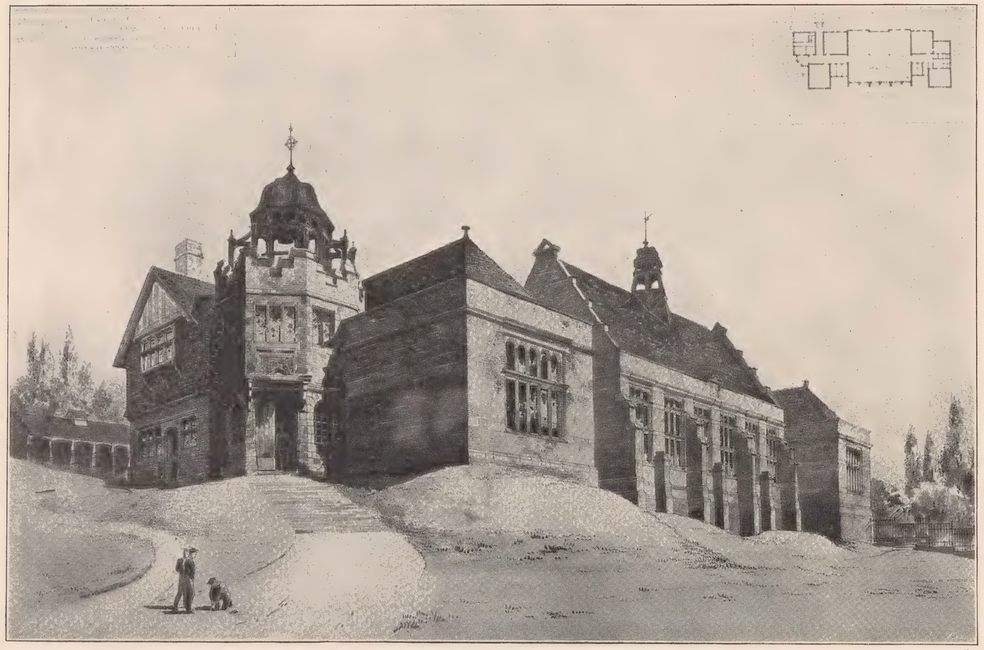
STATION:
Architect Charles S. Frost, for C. & N.-W. R'y ....Sept.

STORE BUILDING:
Architect Louis H. Sullivan, for Schlesinger & Mayer .....Jan.

WAREHOUSE:
Architect Samuel K. Colton, for E. C. DeWitt & Co.....Jan.

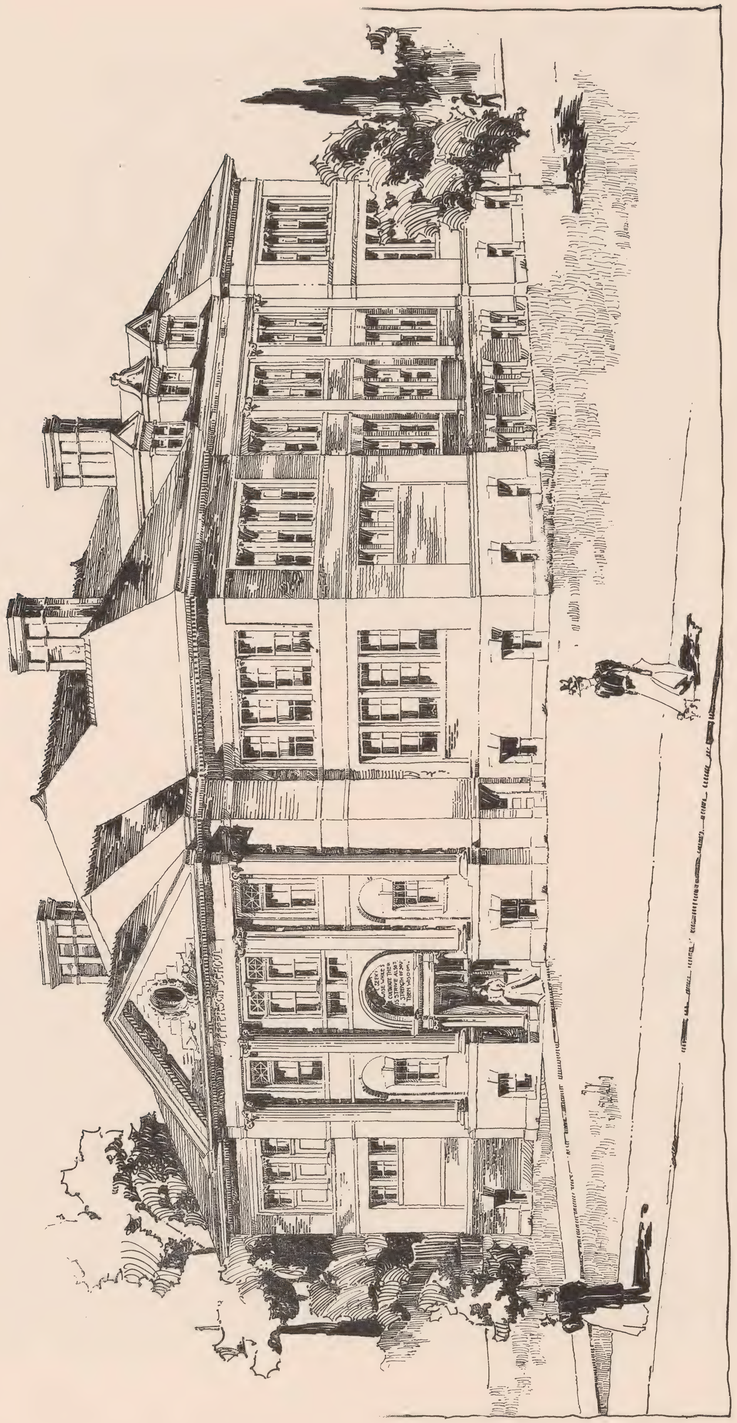


MATHEWS: UPPER CLAPTON. NEW CHURCH ROOM.
Arnold Mitchell, Architect, London.



DESIGN FOR THE COLFE GRAMMAR SCHOOL, LEWISHAM, ENGLAND.
Arnold Mitchell. Architect, London.

SELECTIONS FROM THE ST. LOUIS ARCHITECTURAL CLUB EXHIBITION OF 1900.



JEFFERSON SCHOOL BUILDING.
Wing & Mahurin, Architects, Fort Wayne, Indiana.

CUPPLES STATION, ST. LOUIS.

View of Warehouses from Tenth and Clark Avenue.

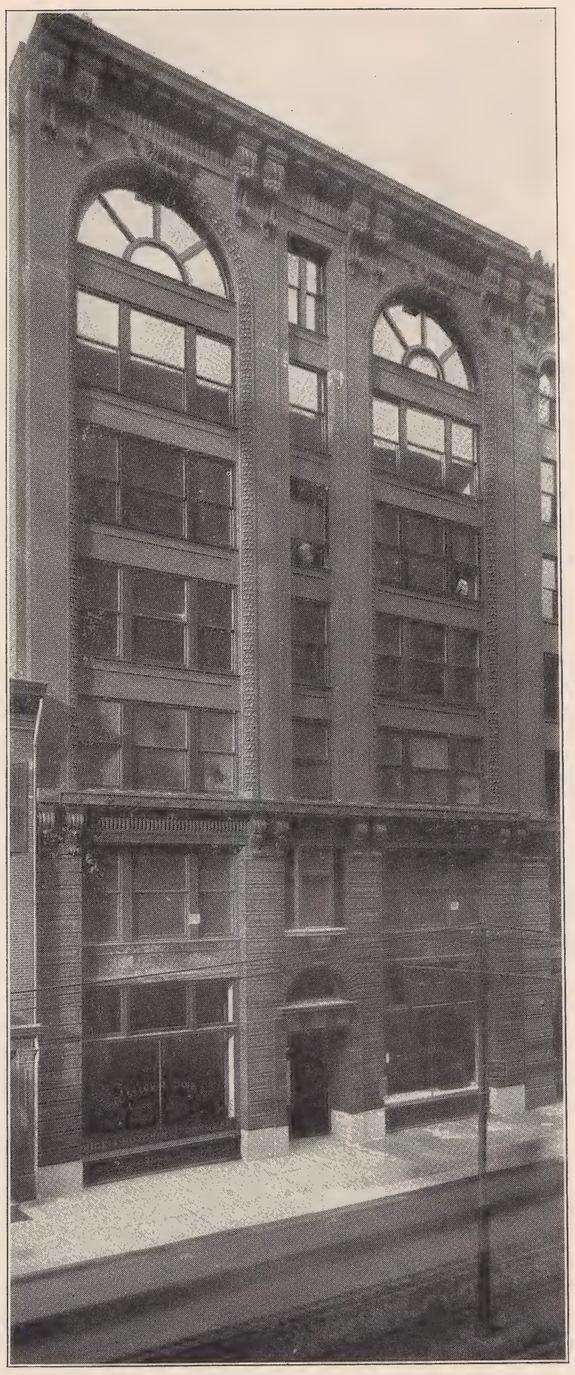
Eames & Young, Architects.

COMMERCIAL WAREHOUSES.

Southwest Corner Thirteenth and Washington Avenue.

FOR WASHINGTON UNIVERSITY. FOR ISAAC W. MORTON.

Eames & Young, Architects.



COMMERCIAL WAREHOUSE FOR WASHINGTON UNIVERSITY.

Eames & Young, Architects.

CUPPLES STATION, ST. LOUIS. WAREHOUSE NO. 6.

Eames & Young, Architects.

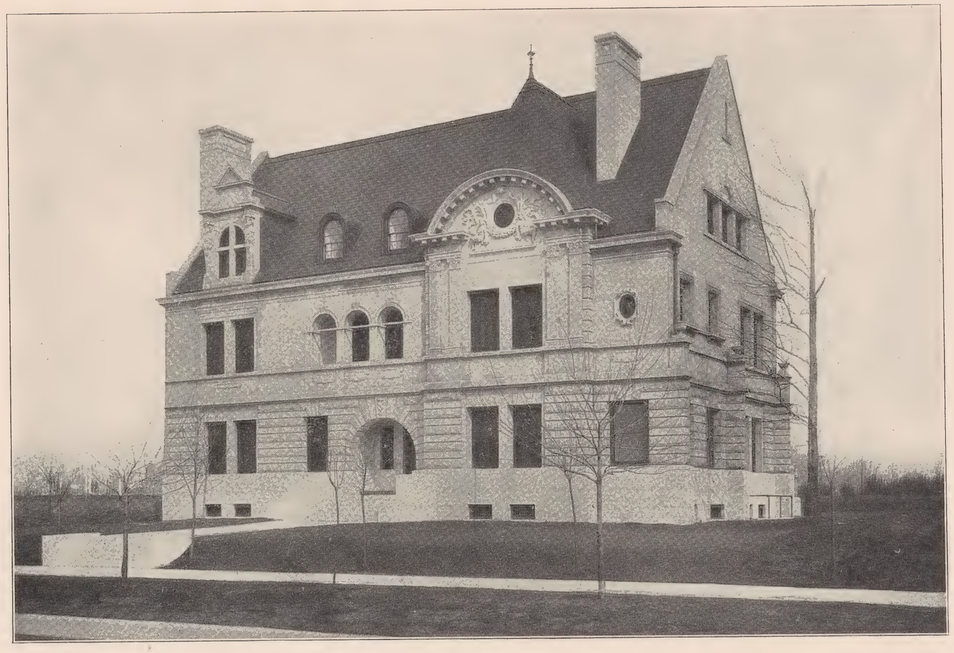
SELECTIONS FROM THE ST. LOUIS ARCHITECTURAL CLUB EXHIBITION OF 1900.

RESIDENCE OF JOHN A. HOLMES, ST. LOUIS.

Shepley, Rutan & Coolidge, John Lawrence Mauran, Architects.

ENTRANCE TO FLORA BOULEVARD, ST. LOUIS.

Weber & Groves, Architects.



RESIDENCE OF W. NORTHRUP MC MILLAN, ST. LOUIS.

Eames & Young, Architects.

RESIDENCE OF ROBERT S. BROOKINGS, ST. LOUIS.

Eames & Young, Architects.

SELECTIONS FROM THE ST. LOUIS ARCHITECTURAL CLUB EXHIBITION OF 1900.

ADDITIONS TO EDGEWORTH MANOR, GLOUCESTER, ENGLAND, FOR ARTHUR J. JAMES.

Ernest George & Yeates, Architects, London.

ELEVENTH STREET REALTY COMPANY'S BUILDING, ST. LOUIS.

Isaac S. Taylor, Architect.

COMMERCIAL WAREHOUSE FOR WILBUR F. BOYLE.

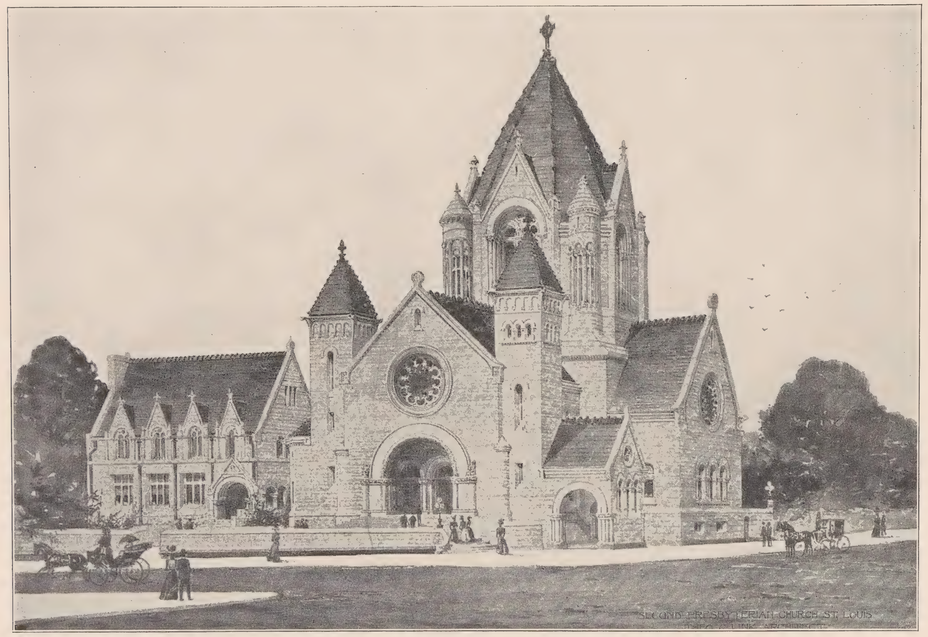
Shepley, Rutan & Coolidge, John Lawrence Mauran, Architects.

COMMERCIAL WAREHOUSE FOR LINDELL REAL ESTATE COMPANY, ST. LOUIS.

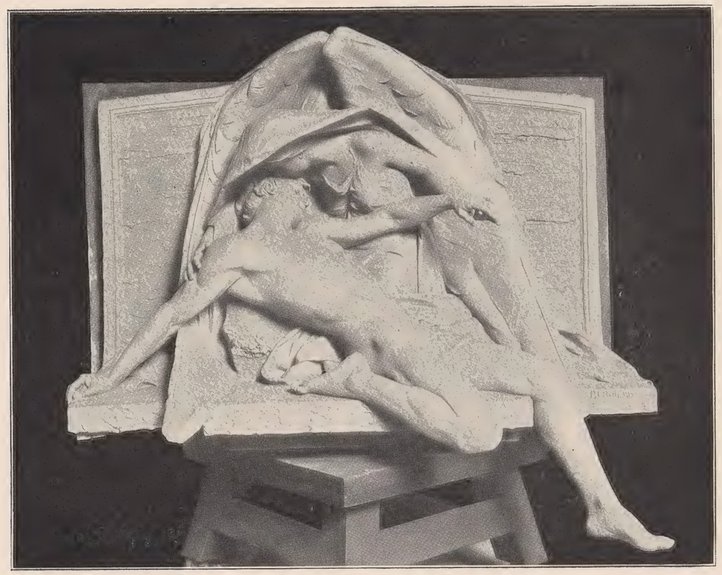
Shepley, Rutan & Coolidge, John Lawrence Mauran, Architects.

SELECTIONS FROM THE ST. LOUIS ARCHITECTURAL CLUB EXHIBITION OF 1900.

EUGENE FIELD SCHOOL, ST. LOUIS.
William B. Ittner, Architect.



ACCEPTED DESIGN FOR SECOND PRESBYTERIAN CHURCH, ST. LOUIS.
Theodore C. Link, Architect.



THE KISS OF IMMORTALITY.
Robert P. Bringhurst, Sculptor, St. Louis.

HOUSES ON WASHINGTON AVENUE, ST. LOUIS.
E. A. Manny, Architect.

SELECTIONS FROM THE ST. LOUIS ARCHITECTURAL CLUB EXHIBITION OF 1900.

INLAND ARCHITECT PRESS.

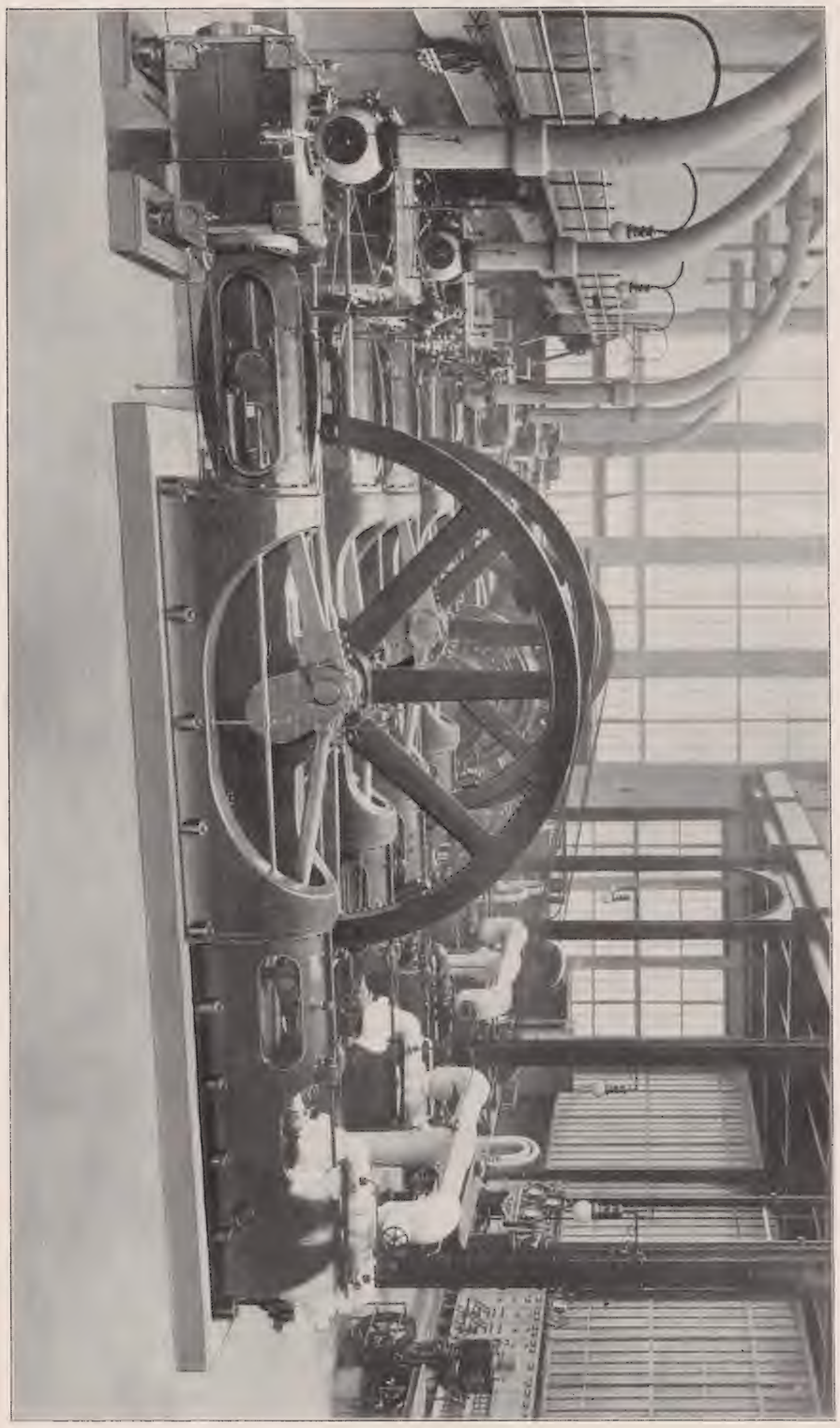
RESIDENCE OF H. F. WOODS, CINCINNATI, OHIO.

ELZNER & ANDERSON, ARCHITECTS.

INLAND ARCHITECT PRESS

HALL IN RESIDENCE OF DR. ERIC SATTLER, CINCINNATI, OHIO.

ELZNER & ANDERSON, ARCHITECTS.



VIEW OF ENGINE AND GENERATOR ROOM, ARMOUR CO'S NEW ELECTRICAL POWER PLANT, CHICAGO—ICE MACHINERY IN FOREGROUND.

SPECIAL SUPPLEMENT.

THE INLAND ARCHITECT AND NEWS RECORD

VOL. XXXV. MAY, 1900. No. 4

TECHNICAL REVIEW, THE ARMOUR COMPANY'S NEW ELECTRICAL POWER PLANT.

THE LARGEST AND MOST MODERN ELECTRICAL POWER PLANT IN THE WEST.

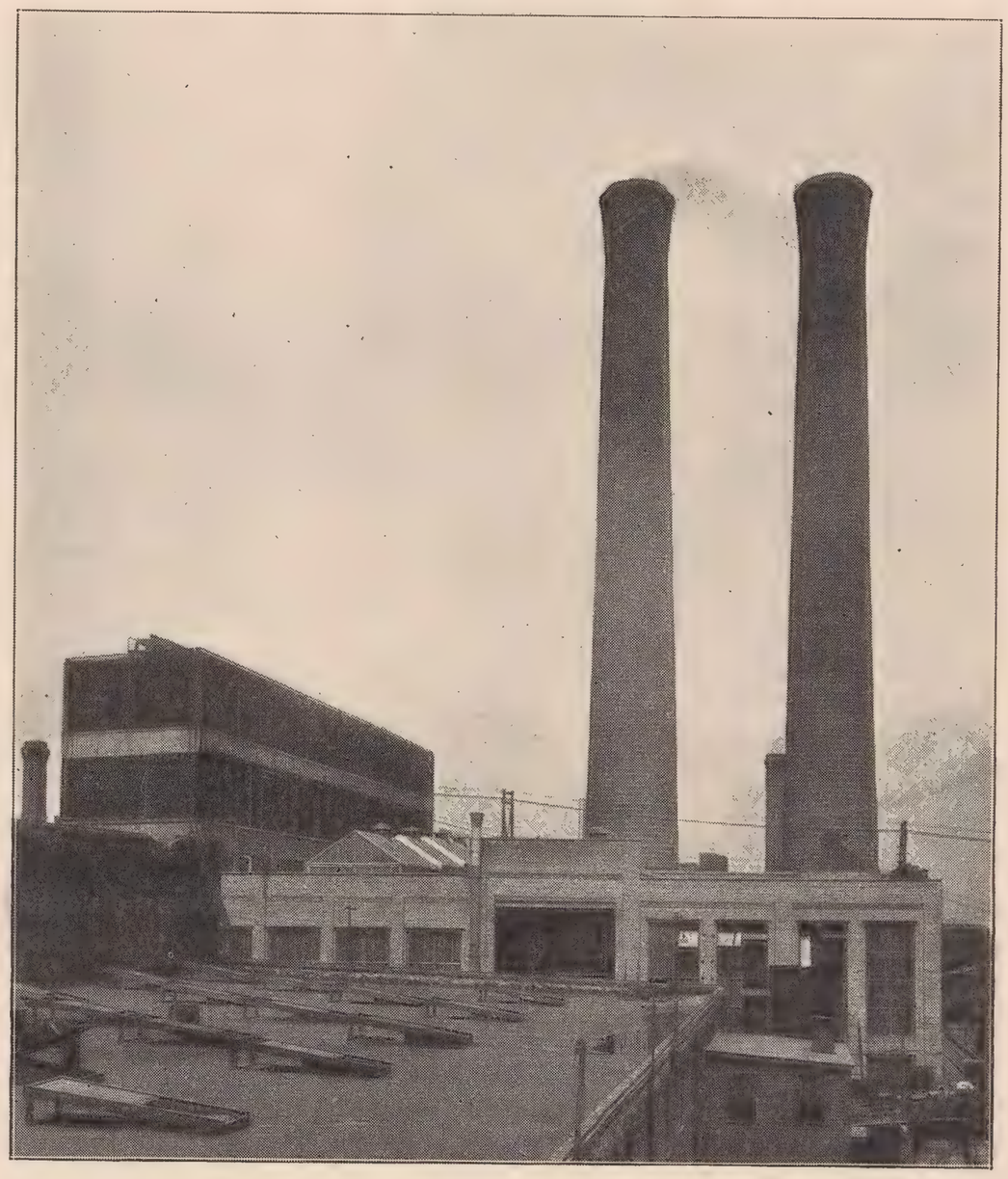
THE complete modern structure of the present day requires the services of many men of special training. Besides the architect, whose training and supervision must be of the broadest character, there must be the electrical and the mechanical engineer, both men of technical education and ripe experience. While the architect must be generally well informed as to all the details of the work, he can not expect the highest success unless he is aided in his work by most trustworthy lieutenants in the special departments pertaining to machinery and electricity.

This is an age of such rapid progress that the engineer of today is behind the times tomorrow if he is not progressive in the broadest sense of the term. The electrical engineer of ten years ago, for example, would be at his wits' end were he to be suddenly set down in a modern electrical plant. The dynamo-room is a lofty, airy apartment, the walls of which may be finished in white glazed brick or other suitable and elegant material. The floor is mosaic. The engines and large generators are direct coupled and all except the bright parts are painted a maroon color. No wires, no belts, and but little steam piping are visible. Everything is sweet and clean. In the boiler and fire room all the coal and ashes are handled by machinery automatically and every detail of the production of thousands of horse-power of electrical energy is carried out with the utmost smoothness and celerity.

The close of the present century is marked by a degree of advancement in the details of constructional work such as the world never before dreamed of, and the future looks forward to the development of the forces thus placed in our hands on a scale of excellence and grandeur of which we now have but a faint conception. Only practical demonstration can show what the possibilities of the present equipment in materials and experience will be. Especially is this true of electrical science, in which we of the present age may be witnesses of still greater marvels in the future than in the past.

Electricity, in its ever-varying aspects, presents to the architect and electrical engineer of the present day an interesting and profitable field for investigation and experiment. It has come into being practically within the past twenty years, for though nearly all of the essential properties of the mysterious fluid were known long ago, yet the painstaking economies by which it has become of practical application in the work of building have been evolved by slow processes within the memory of most of us. And it goes without saying that the end is not yet, but that in the near future the world is destined to see some even more important adaptations of electricity to the uses of every-day life which are now served by other and more clumsy or more expensive agencies. In this development, important discoveries are to be made and more important adaptations of present well-known principles are to be perfected, and to the successful experimenter along these lines there will come the reward of honor and fortune which is well worth the seeking. To the architect and electrical engineer, however, the practical side of electricity will ever be the uses to which it can be put by him in the work to which he devotes his attention from day to day, and to a consideration of this phase of the subject we shall confine ourselves.

The practical development of electricity seems to have been along the line of least resistance—from the smaller to the greater. First we had the electric bell, the telegraph and the telephone, and later the electric light and the power plant, and, in course of development, heating and ventilating, etc. Nearly all of these uses have



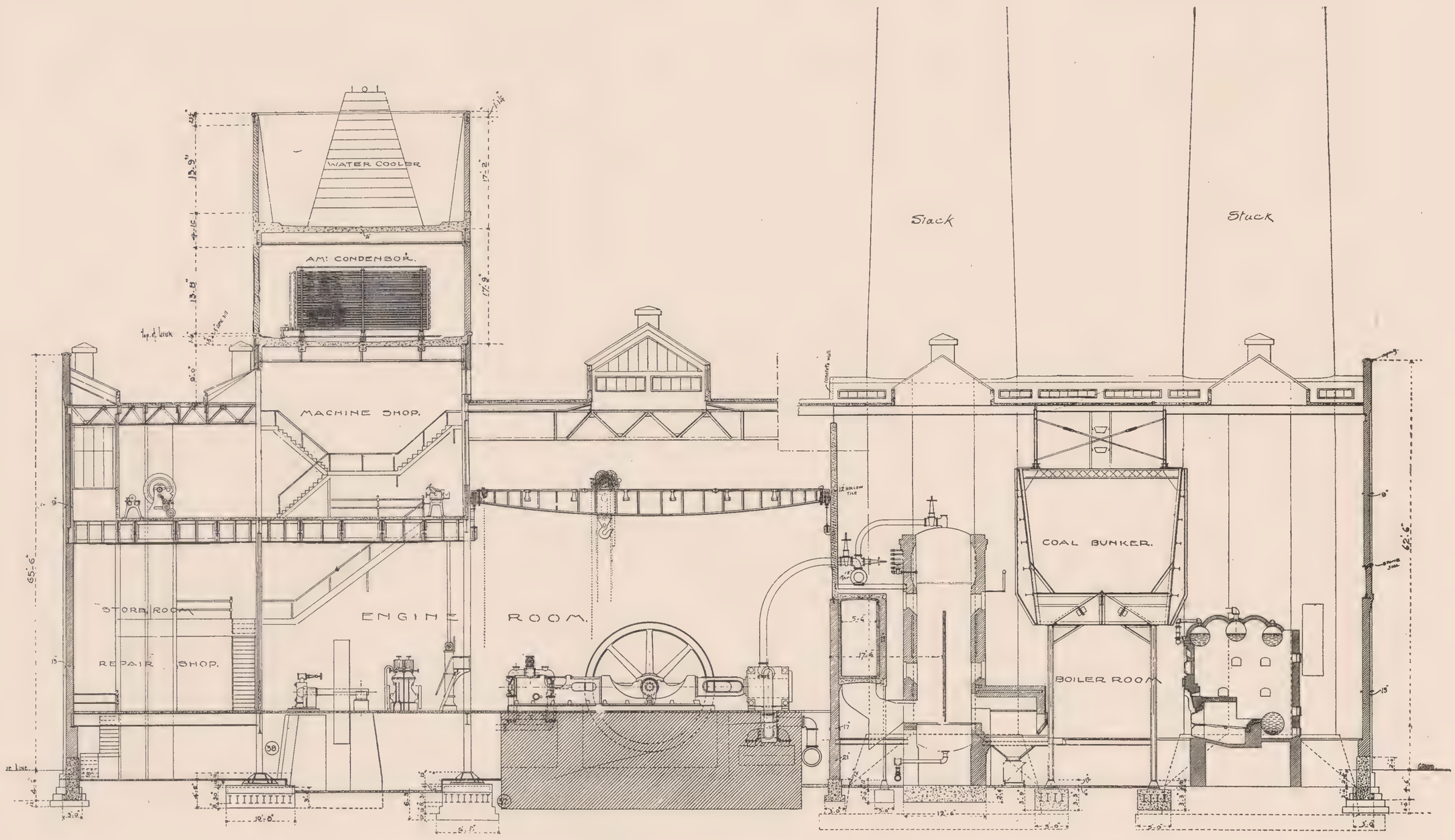
GENERAL VIEW OF EXTERIOR OF POWERHOUSE.

reference to architecture more or less directly. They should all be a part of the learning of the architect who aspires to know his profession in the light of present-day achievement, as well as in the dead past. For he can not go far upward in his chosen calling without being asked to specify some if not all of the architectural utilities of electricity.

From the beginning, the problem has been one of commercial utility quite as much as of the public convenience. The owner wants to know first of all whether the substitution of electricity for any other agent will be profitable, and the progress toward general adoption of electric light, power, etc., has been by cheapening production and increasing efficiency. It is practically demonstrated at

the present time that electricity is not only the best but the cheapest medium for light and power wherever normal conditions prevail. In other words, that no construction can be said to be strictly up to date that does not employ the maximum of the electrical.

Some of the most important architectural considerations relating to electricity are entirely outside the domain of electrical science, as, for example, the matter of foundations for the power plant, conduits, ornamentation and arrangement of lights, etc.; and this fact suggests that it is not desirable for the architect to be an electrical engineer, but rather that he should be an electrical architect. His work is broader than that of the engineer, and involves general design and supervision rather than mechanical detail, and is therefore most important. With the smaller and simpler constructions involved in residence and similar work, the task is comparatively easy, but with the larger problem of great power plants which are coming into universal use, there is need for the most thorough preparation and the most careful planning, and he must call to his assistance the technical and fundamental knowledge of the electrical engineer and mechanist. It is this adaptation of electricity to the largest and most extended



THROUGH-SECTION DETAIL OF POWER PLANT.

plants, requiring enormous horse-power and working many diverse machines over a wide area, that is of especial interest to the architect at the present time, for this construction is destined to revolutionize industrial architecture in the near future, if indeed it has not already done so.

Owners of large plants have been reluctant to assume the heavy expense involved in a change from steam to electrical power. Where a forest of belts and shafting must be replaced by wires and motors, and the steam boiler and engine service which sufficed very well for the former task must be thrown into the junk pile to make way for modern power-producing engines which can be installed only at a heavy expense, the practical advantages of the change must be made very plainly evident to the average hard-headed business man. It is important to know that this has been done in one conspicuous instance in Chicago, the great plant of Armour & Company, than which no other could be a more satisfactory instance of the marvelous adaptation of electricity to power purposes under peculiarly exacting conditions.

Loss of power in the transformation from steam engine to dynamo and in the further transmission by wire to the several motors, is of course inevitable, but has been minimized so successfully that it is no longer of serious importance. In fact, the ordinary loss by friction of shafts and slipping of belts under the old system is largely done away with by the use of electricity, and the resulting economy is a prime factor in favor of the new system. Especially is this the case where the power must be transmitted over long distances from the central station. In cases where it has been necessary to install several steam plants in order to reach the locality to which the power is to be applied, it is now possible to bring to bear an efficient and economical service at any point desired over a very large area of ground, and to confine the power station to a single convenient center of coal or water supply. This advantage alone must ever make electricity the ideal power, whether for small plants served from a central station, or for a large industrial institution having its own facilities for power production. Not only economy in transmission, but safety from fire and accident, as well as cleanliness and convenience, all favor the use of electric power.

The establishment of Armour & Company at the Chicago Stock Yards is of such magnitude that it is difficult to adequately convey to the reader by words and figures a really comprehensive idea of its size and importance. The plant occupies an L-shaped area of sixty-five acres, all of which is utilized by streets and buildings, the latter from two to ten stories high. The business is conducted in fifty-two distinct departments, such as the slaughtering, pickling, smoked meat, canning, sausage, lard, ham, pigs' feet, tripe, extract, pepsin, dry salt, sweet pickle, hide, oleo, wool, fertilizer, cooperage, tin, printing, packing and shipping departments. From the slaughtering establishments the various parts go direct to the several departments, each of which is operated independently of all the others, and all of which are so widely distributed over so great an area that the services of an electric railway are required for quick transportation from one part of the grounds to the other.

About seven thousand workmen are employed in the Armour plant. The capacity of the slaughter house is 15,000 hogs, 3,000 cattle and 7,500 sheep and calves per day. The slaughtering department may be considered the center of the establishment, from which all the other departments receive their supplies of raw material to be manufactured into food or fertilizer or other product, as the case may be. No part of this work, however, can be carried on without the liberal use of machinery and the application of power over a vast area of ground, to say nothing of the transportation of the raw and finished products to and from the several factory buildings. The power problem is thus seen to be the most important consideration in the entire enterprise. Perhaps next in

importance is the refrigerating department, in which the perishable products are preserved until they can be marketed. In the change to electric power both of these departments had to be taken into consideration.

The new Armour power station is about 200 by 200 feet and four stories high. It is of steel construction, with brick walls, and provides quarters for the entire machinery department of the company. The basement is used for storage purposes in part. The floor of the basement is three feet below the sewer line and is protected from water by porous tiling draining into sinks which are automatically emptied by bilge pumps, so that the floor of the basement, which is of concrete, is always dry. The first or ground floor of the building is occupied by the boilers and engines. The engine-room floor is of stone concrete, and is laid off in 13-inch squares, with a 2¼-inch red tile across the corners, making a very handsome appearance. An iron grating is substituted for the concrete of the floor over the main exhaust pipe for facility in making repairs. The second floor is occupied by the machine shop. On the third floor are the ammonia condensers, and on the fourth floor the water cooler. All the floors and the roof are made of concrete laid on iron rods covered with wire cloth. The roof is composed of a 3-inch cinder concrete, covered with a composition of felt, tar and gravel. The machine shop and store-room floors are made of stone concrete laid between wooden sleepers and covered with a 1½-inch maple flooring. The condenser and cooler floors are made in the same manner, except that the sleepers are left out and an asphalt basin an inch thick is put on top of the concrete.

Cement, iron and wire-glass are used throughout the building. The brick walls of the engine-room are plastered and wainscoted in Portland cement. The partitions are of brick, tile or wire-glass in hollow metallic frames. The wall between the boiler and engine rooms is of brick up to the bottom of the crane girder, and above that to the ceiling is of hollow tile. The partition separating the engine-room from the store-room is of brick to the height of seven feet, above which is twenty-two feet of wire-glass in hollow metallic frames. On the machine-shop floor the partitions are of tile and wire-glass. The skylights are of wire-glass resting on concrete curbing, and well ventilated. Stairs and walks are all of iron, making the building fireproof from itself as well as exterior encroachment of burning structures.

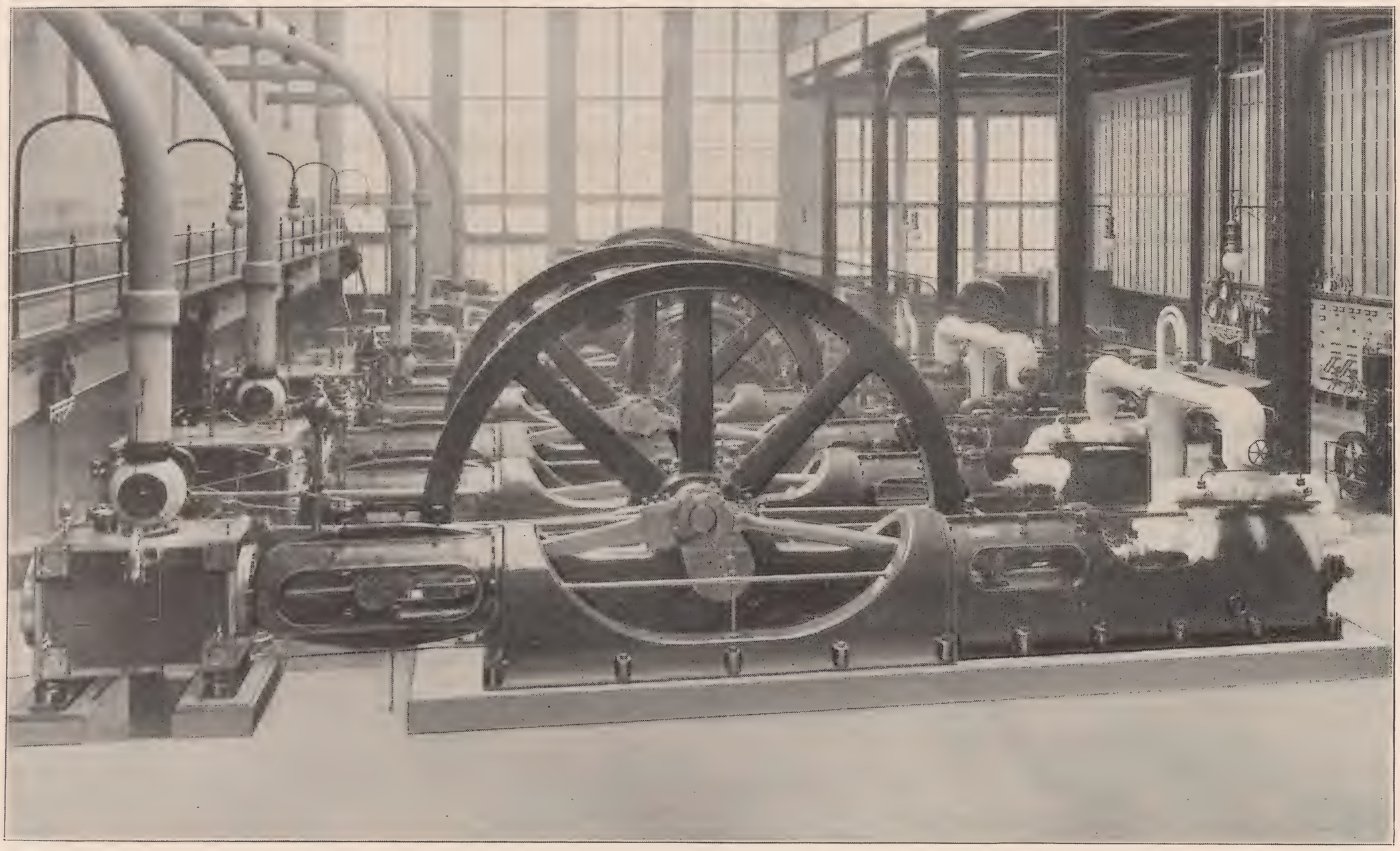
All ceilings and walls are painted white, except the wainscoting. In a similar manner the upper steel work is painted yellow, while below the top of the wainscoting the walls, engines and generators are painted a dark green and striped with gold. The effect is harmonious and pleasing.

In this building is located the power plant which takes the place of all the former plants on the Armour property. The

GENERAL PLAN OF POWER PLANT OF ARMOUR & CO.

Armour machinery department heretofore consisted of ninety-three steam boilers, four of which were of 400 horse-power capacity each, and sixteen steam engines, ranging from 25 to 600 horse-power. Besides, there were seventeen refrigerating machines of from 75 to 100 tons capacity each. There was nothing like an attempt to economize space and time by a centralization of these plants, but they were located indiscriminately in all parts of the yard, with the poorest of facilities for receiving fuel in some instances, and operated at the maximum of cost and inconvenience. Coal and ashes had to be handled with wheelbarrows and carts, and the cost of keeping the streets in repair so that a horse could haul a specific load was a considerable expense.

Of primary importance is the saving of labor in the new plant as compared with the old. To properly run the steam plant under



VIEW OF ENGINE AND GENERATOR ROOM.
Linde Ice Machines, Installed by the Fred W. Wolf Company.

the former unfavorable conditions, 147 men were required. By the labor-saving appliances of the new plant this force has been materially reduced, while the results under the present system are incomparably superior.

Great as the establishment of Armour & Company is at present, there is no thought in the minds of the management of stopping at present proportions. There must be room for growth, for growth on a great scale is sure to come. And so in planning a power plant, provision had to be made for the future. The building must be large enough to contain the machinery and the plant itself must be on such a plan that it can be readily added to without making any radical changes. Such is the Armour plant as at present constituted. The boiler capacity is 4,500 horse-power; the refrigerating machinery has a daily capacity of 900 tons; the pumping capacity is equal to 9,000,000 gallons a day. But all this is capable of being doubled, while there is at present installed 4,000 horse-power of electrical machinery; air compressors with a capacity of 4,000 cubic feet of air a minute, and a condenser having a capacity of 1,500 pounds of steam a minute. Some idea of the magnitude of this plant when completed may be gathered from the fact that there will then be a combined horse-power in the boilers of more than three times that of the old plant, which was regarded as sufficient for one of the largest industrial establishments in the world.

The present boiler instalment includes twelve vertical water-tube boilers, each of 375 horse-power capacity, and arranged in two batteries of six boilers each. The plant when enlarged to its fullest capacity will contain double this number of boilers, but for the present the twelve are sufficient. The boilers occupy a space 22 feet wide and 68 feet long, or about 1,500 square feet, and it is calculated that they will develop three horse-power for every square foot of space they occupy. These water-tube boilers are of an improved type, so constructed that the heat from the furnace is confined until its full efficiency is obtained. For this purpose the tubes are divided into two sets, known as the risers and down-comers, the water rising in the former and falling in the latter. The risers are in front in the hottest of the flames. The heat goes upward along the risers and at their top is diverted downward along the down-comers, and escapes at the back of the furnace. The water in the tubes circulates along the same general lines with the heat. The feed-water enters the boiler directly over the down-comer tubes.

Two brick stacks are provided, one for each battery of boilers. They are 12 feet core diameter and 225 feet high, and are arranged on foundations 50 feet from center to center, 37 feet square and 14 feet deep, on four layers of steel beams. These stack foundations are entirely independent of the building walls, which are carried on heavy steel girders supported by independent foundations.

The arrangement for carrying the coal to the furnaces is ideal, and is an excellent example of the advantages of labor-saving appliances. The coal is brought directly from the mines in cars and delivered at the powerhouse. It is shoveled from the cars on to an incline from which it slides into the coal run, which is operated by electricity, and is thence carried along to the crushers, where it is reduced to uniform size. From the crushers the coal is carried by the conveyors up over the top of the boiler-room to the coal bunkers, into which it is emptied. There are two sets of coal bunkers, one for each two batteries of boilers, having a capacity each of 600 tons. They are elevated to a height sufficient to allow the coal to be delivered into the mechanical stokers below them readily by gravity alone. As fast as the coal is needed in the furnaces it passes in this manner into the stokers and thence into the fire-boxes of the boilers. The action of the stokers need not be described in this connection. They are operated with engines of their own installed in double sets, so that either set is available in case of a breakdown or an emergency.

The ash-pits are of the hopper type and allow the ashes to be automatically dumped into the steel cars placed under them. These cars are run out on tracks to south end and carried to the top of the building, where their contents are dumped into a receiving hopper, which is directly connected with a long down-spout conveying the ashes into cars for removal from the premises.

The piping from the boilers to the engines is of interest as well as the great valves that the Crane Company furnished, all pipe and valves undergoing the highest tests before being installed.

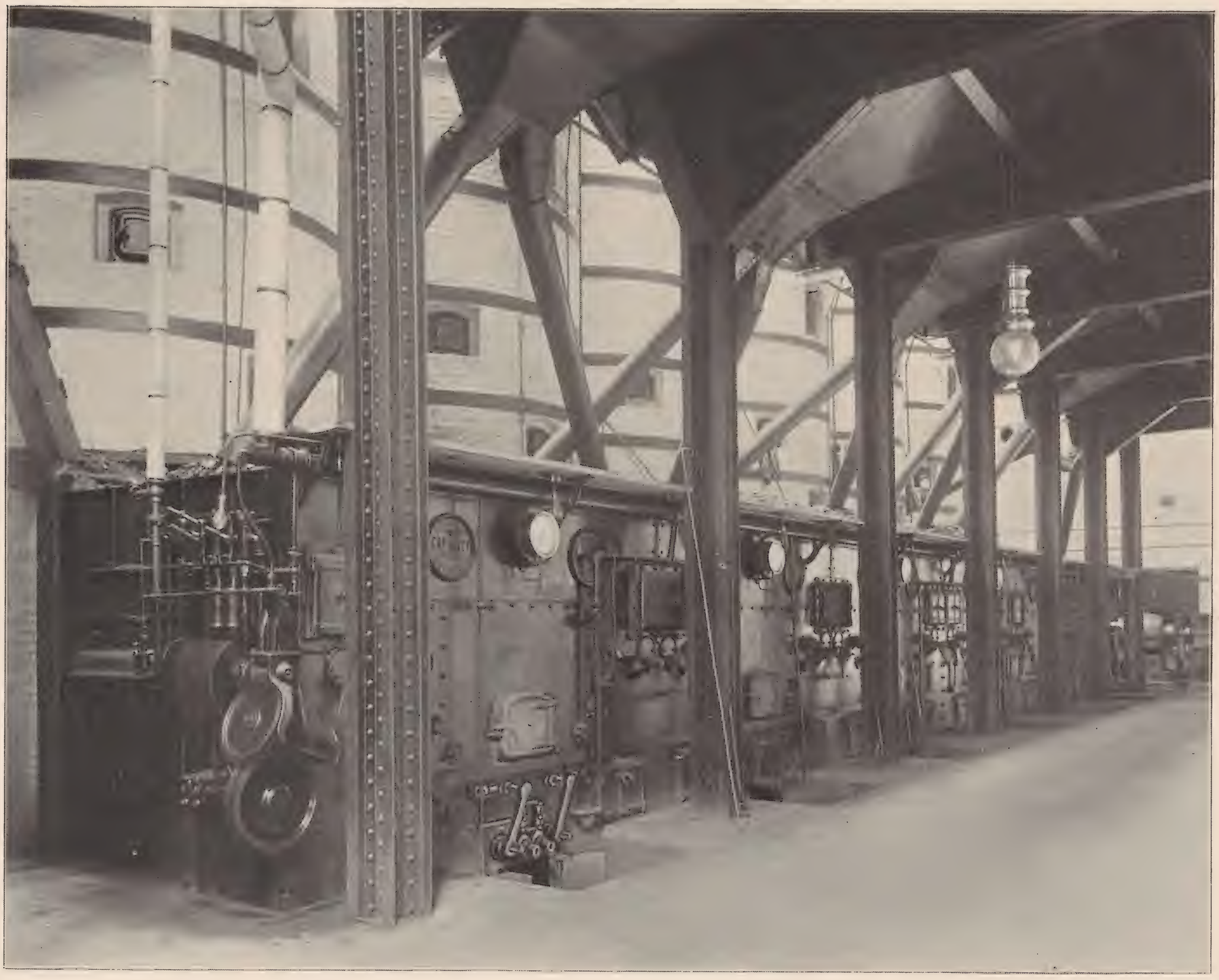
The engines, though made by various builders, are all of the Corliss compound condensing type. A description of one will suffice for all. The largest of the engines has a high-pressure cylinder 32 inches in diameter; low-pressure cylinder, 62 inches; stroke, 48 inches; speed, 85 revolutions per minute. This engine drives a direct-connected direct-current Walker generator of 850 kilowatts capacity, and also drives by ropes a 350-kilowatt single-phase alternator. Two other similar engines have 24-inch high-pressure cylinders, 46-inch low-pressure, and 48-inch stroke, running at 90 revolutions per minute. Each of these engines is direct-connected to a 500-kilowatt direct-current Westinghouse generator and also drives a 180-kilowatt single-phase Warren alternator by ropes.

The control of this entire system of electric energy is centered in the switchboard, which is 44 feet long and 8 feet high from the floor of the dynamo-room. The board itself is of Vermont marble 2½ inches thick and arranged in eighteen sections. The control is designed for an alternating current system of 710 kilowatts at 1,100 volts for general incandescent lighting, and a direct current 550-volt system of 1,850 kilowatts output for the operation of power motors. The only unusual feature of the board is the location of the circuit-breakers, which are all at the bottom of the panel. The engineers who designed the board thought it would be handier to close the breakers by lifting than by pushing, hence this change.

From the dynamos the electric current is distributed over the sixty-five acres of the Armour plant to the motors, of which there are 111 in number, ranging in power from 1½ to 200 horse-power, and aggregating 3,600 horse-power. As far as possible they are arranged to drive machines in sets, there being few instances where a motor is employed for one machine only. Individual motors are used for the elevators, large fans and pumps. Aside from these there are more small than large machines in the plant, and they are arranged as far as possible in groups, so that one motor can be used for each working floor wherever practicable. Motors of various makes are employed, the favorite sizes being 15 and 25 horse-power. Many geared machines are used, directly connected to shafts. This type of motor seems to be a favorite in the Armour plant. Everywhere the most careful consideration of economy is evident, the motors being of the size, type and arrangement best suited to the work they are to perform.

One of the marvels of the Armour plant is the refrigerating machinery which, when complete, will have a capacity of 2,100 tons of ice daily. The two Linde machines now in operation are of 450 tons capacity each and are operated by Corliss compound condensing engines having 26-inch high-pressure cylinders, 48-inch low-pressure and 48-inch stroke. The ammonia cylinders are of 21-inch diameter and 48-inch stroke. Two new machines are to be installed on similar lines but with greater capacity. They will each be equal to 600 tons of ice daily, and the total capacity of the plant, 2,100 tons, will be the largest refrigerating plant in the world.

The arrangements for piping the cold fluid are of the best. In preparation for the instalment of the new plant, 500,000 feet of 2-inch expansion pipe have been installed, and every fitting, valve



DETAIL VIEW, BOILER AND FURNACE ROOM.
Showing Coal Bunkers and Down-spout.

and flange has been sweated and tested before being put in place. The coils are, in nearly every case, placed in a bunker provided for the purpose; they are suspended from the floor above by hangers made of bar-iron and hooks, the object being to get them near the ceiling, in order to permit the use of a composition paper roofing on the decks.

For convenience in making repairs, connections are so provided as to allow any individual coil in the entire system to be pumped out and repaired without interfering with any other part of the system. This is effected by means of an independent suction which connects with an opening in each coil. Connected with the auxiliary suction referred to and the pump-out connection from the ammonia condenser, is a small 6-ton vertical refrigerating machine in the engine-room, by means of which it is possible to pump out any part of the entire system, or charge the system without the use of the large machines. This is a feature not found in any other plant, and is of the utmost utility in a system where the largest possible units are employed.

A novel but very useful feature of this great plant is the pneumatic system, whereby compressed air is put to a variety of uses. The compressed-air system has been a gradual development at the Armour plant and is now considered one of the most valuable adjuncts of the industry. It is employed for running small air motors in the cold-storage rooms, where electric motors would not give the best results; for agitating oils and lard during processing; for mixing the brine in the packing department; in combination with gas for branding purposes; for operating hoists and engines; used in opening and closing scrapers and in the pumping of artesian wells. The air-compressing plant consists of one 30 by 60-inch and one 20 by 48-inch air compressors, connected tandem with Corliss steam engines of the same dimensions. These engines were formerly used in the old plant.

A very essential and interesting part of the plant is the boiler-feed and condensing apparatus. Boiler-feed pumps are provided, of the outside packed plunger type, and the heater is an open one of original design. For the purpose of pumping the condensing water into the cooling tower, triplex pumps, direct connected to electric motors, are provided. Pumps of the rotary type are used in connection with the condenser, after the usual manner. For fire purposes a large pump has been installed in the boiler-room. The total water-pumping capacity of the plant when complete will be 10,000,000 gallons a day.

This description is necessarily brief. In the pages following we shall take up the several departments of the work in detail.

THE CONSTRUCTION IN DETAIL.

No description of the Armour plant would be complete without a deserved tribute to the architect and engineer through whose skill and ability the entire construction was possible. Charles F. Hall is the architect and Pierce & Richardson were the consulting electrical engineers. They designed the switchboard and wrote the specifications for same. Both architect and consulting engineers proved able assistants to J. E. Smith, the engineer and superintendent of the electrical and power energy, and it is due to his efforts and insight into the needs of the present and future that the success of the change from steam to electrical power has proven a success. Together they have built in the Armour plant a monument to their genius which will outlive them, and which for the present at least is a pattern for all similar construction of the highest type.

THE MASONRY.

Three million brick were used in the masonry work. Perhaps the least important part of this work was the outside wall, which in the ordinary building is of primary importance. The engine foundations and the stacks were the important points in this construction, and they were done in characteristically thorough manner by Jacob Rodatz, the well-known mason and general contractor, of Chicago. His work on the engine foundations can not be excelled. But perhaps the most remarkable achievement of all was the building of the stacks. These required two months to complete. They are set on special foundations of concrete and railroad iron and are of enormous proportions. They are 27 feet in diameter at the base and 18 feet at the top, and rise to the height of 225 feet above the engine-room floor. They contain a perfectly straight core, or smoke flue, 12 feet in diameter. Standing as they do in a conspicuous position in the yards, only 50 feet apart and towering to a great height, they are a splendid tribute to the contractor who reared them. Those interested in the construction of stacks may gather some information of details from the illustrated drawing in these pages.

STEEL CONSTRUCTION.

The structural steel for the Armour plant was manufactured and erected in the usual manner by the Illinois Steel Company, through their Structural Department. This class of mill buildings, as they might be termed, including powerhouses, factory buildings, etc., require special design and construction, and the columns, girders and beams are of excellent workmanship in this building, as may be seen by the illustrations. This company makes a specialty of this kind of work. Their facilities for designing, manufacturing and erecting structural ironwork are unsurpassed. The element of time in an enterprise of this kind is of the utmost importance. Delays attendant on securing the iron for a large building are most frequent and annoying, but the facilities of the Illinois Steel Company are such that all orders accepted for delivery at a certain time can be filled promptly and satisfactorily, a fact which is worth much to the architect and owner. The Structural Department of the Illinois Steel Company is in charge of William H. Pratt, manager, and the headquarters are at 50 Wabansia avenue, Chicago.

THE STAMSEN & BLOME SYSTEM OF FLOOR CONSTRUCTION, AS SHOWN BY THE ACCOMPANYING CUTS.

The use of concrete in this building was carried to the limit of its possibilities as a constructional material. It is a fine example of the possibilities of this durable form of construction as applied to a modern steel frame. The roofs, condenser and cooler floors, boiler-room floor, repair shop and machine shop floors, breaching floors, walks over coal bunkers, and engine-room floor are all constructed according to the Stamsen & Blome concrete system, as is also a concrete floor laid in the basement, altogether a total area of nearly 100,000 square feet.

The roof is constructed of Portland cement cinder concrete, with a "float top" left ready for composition roofing. The condenser and cooler floors are also constructed of Portland cement cinder concrete, with an asphalt top dressing.

The engine-room floor, repair shop and machine shop floors, boiler floor, breaching floors and walks over coal bunkers are constructed of stone concrete; the boiler floor, breaching floor and walks over coal bunkers having a one-inch thick granite top dressing, while on the repair shop and machine shop floors strips for wood floor were laid, embedded in concrete.

The engine-room floor is finished with a fancy tiled concrete, being laid out in blocks twelve inches square, with red tile dots, 2¼ inches square, imbedded at the junction of the lines of the blocks.

The wall girder of the cooler tower is enclosed in concrete; the sill courses of the condenser and cooler floors are also constructed of concrete.

A number of concrete foundations for engines, ice machine, pump, etc., also two concrete sumps in the basement, were built by Stamsen & Blome.

In concrete construction the matter of strength is always of prime importance and great interest. The roof in this building was to be guaranteed to carry 90 pounds per square foot. However, barrels of putty weighing 900 pounds each and boxes of glass weighing 800 pounds each were dumped in such piles as to give a weight on the floor of about 400 pounds to the square foot without the slightest damage. Heavy machinery, etc., was also rolled across the floors, giving altogether such severe tests as concrete floors are seldom subjected to, so that the strength of this system is for all time and for all purposes established without a doubt.

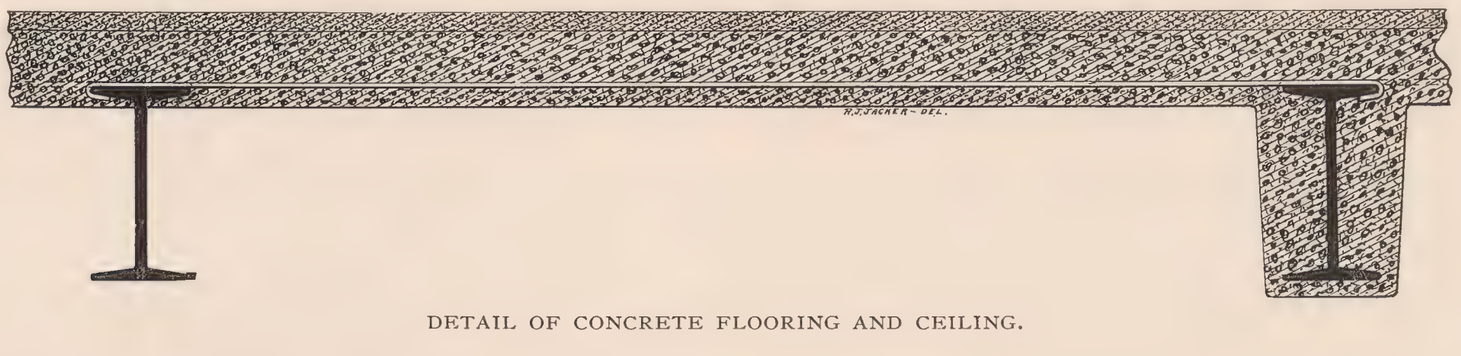
In a large degree strength is quality in concrete construction, but it would not be doing justice to Stamsen & Blome's work to omit mention of its general appearance and method of execution, both of which are the best. The completed work looks its quality, which is an important matter, and this is due to skilful design and execution, for which these contractors are noted. The cost of the concrete work in the Armour plant was nearly $30,000.

WIRE-GLASS FOR FIRE PROTECTION.

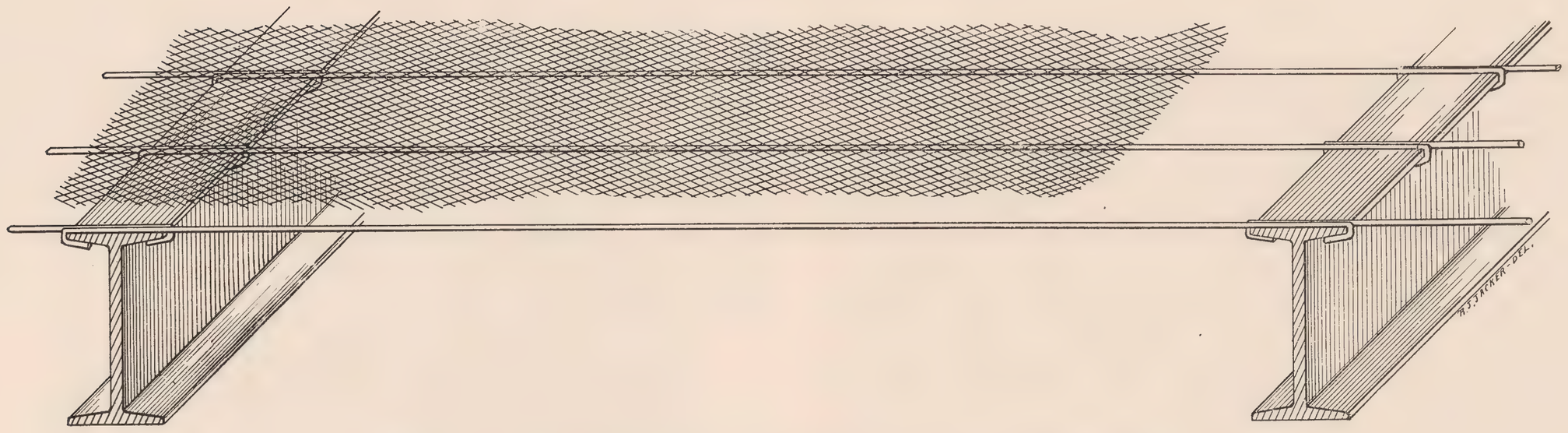
An interesting feature of the building is the Mississippi prismatic ribbed wire-glass, which has come to be recognized as an important factor for the diffusion of light as well as for retarding fires. Its use in this building answers very satisfactorily for both purposes.

An illustration of the lighting qualities of this glass is shown in the Machine Shop, where the square feet of skylight surface in comparison with the cubic feet of the room is very small, and yet the lighting is excellent, and is exemplified by the clear photographs taken. This and other demonstrations establish the conclusion which Mr. Norton, of the Institute of Technology at Boston, came to after two hundred tests, which was that the lighting qualities of this glass as compared to the ordinary window glass, when used in alley windows so related to other buildings that light entered on a slant, made its relative value as three to one.

In March, 1899, the five-story felt factory of Armour & Company was destroyed by fire. Heavy timbers, brick and iron were consumed, but the fire windows of wire-glass in hollow metallic frames remained intact. By their use the glue factory, separated by only a ten-foot alley, was saved. This experience so conclusively demonstrated to Armour & Company the value of solid wire-glass in hollow metallic frame and sash construction that the largest use of it has been made in the new power plant, some 30,000 square feet. Messrs. Voigtmann & Co., of 125 Ontario street, Chicago, are the manufacturers of this window construction, and to them has been intrusted the important work of furnishing the windows and interior partitions of this building.



DETAIL OF CONCRETE FLOORING AND CEILING.

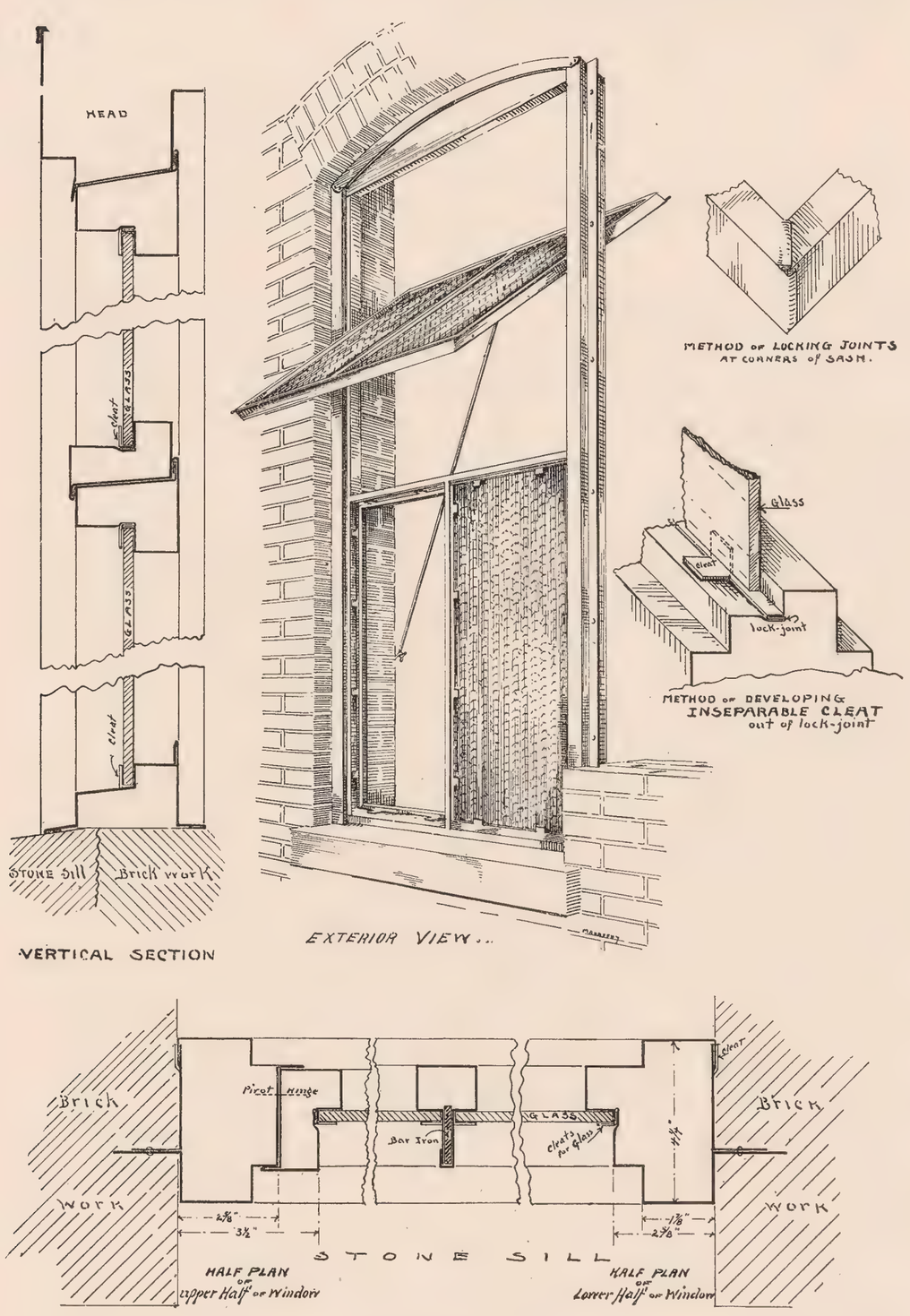


DETAIL OF WIRE CLOTH AND TIE RODS FOR CEILING AND FLOORS.

Not only is the construction of solid wire-glass in hollow metallic frames and sash here shown, but the windows, some of which are 38 feet high, show how this construction, properly reinforced with structural iron, can be generally employed. This is further emphasized by a partition of fire-window construction on the west side of the engine-room, having the following dimensions: Height 21 feet, length 190 feet, and can be readily appreciated looking at the full-page illustration of the engine-room. This window and partition construction possesses marked advantages for lighting and ventilation and at the same time is a barrier against the spread of fire, by a device dependent upon a fusible link, whereby under heat the openings for ventilation are automatically closed and locked.

To fully appreciate the difficulties in the laying out of the glass work in the power plant, the following facts must be kept well in mind: That packing-house property is considered an extra hazard; that of all buildings it is most important to guard this one against the spread of fire, as it is the source of power for operating fire pumps, sprinkler systems and other fire-extinguishing devices. A plant so centrally located must necessarily be in close proximity on all sides to other buildings, which made the matter of lighting a study and fire guards a necessity.

An inspection of the completed plant shows that the general needs of such a building have not only been fully anticipated, but that the desired results have been secured by the agency of this new fire-retarding construction — wire-glass — as fully and completely and as thoroughly applied mechanically as seems possible. In fact, the development of this work would have been a credit to any engineer who might have made a lifelong study of the subject. The solid wire-glass windows in hollow metallic frames and sash are shown to be the ideal fireproof window construction, and are justly endorsed by the fire board of underwriters.



DETAILS OF VOIGTMANN & CO'S AUTOMATIC CLOSING FIRE WINDOW OF WIRE-GLASS AND HOLLOW METALLIC FRAME AND SASH.

THE MANUFACTURE OF WIRE-GLASS.

The desirability of Mississippi solid wire-glass for use in building has long been recognized, but it is only within the past decade that a practical method of manufacture has been devised. As long

ago as 1855, an English inventor named Newton secured a patent on a wire-glass of his invention. His process consisted of pressing one sheet of glass on another with wire between, but this plan proved to be a failure and came to naught commercially.

In 1892, however, Mr. Frank Shuman, of Philadelphia, devised a means whereby wire-glass could be made by embedding wire netting within the center of one solid sheet of glass during process of manufacture, for which patents were granted him by the United States, Great Britain and the continental governments.

The success of Mr. Shuman's method having been practically demonstrated, the American Wire-Glass Manufacturing Company, of Philadelphia, was organized and a factory erected at Tacony, Pennsylvania.

With the installation and operation of this plant, wire-glass became a recognized commercial article. Since then many hundred thousand feet annually have been made and used for the various purposes for which wire-glass is designed.

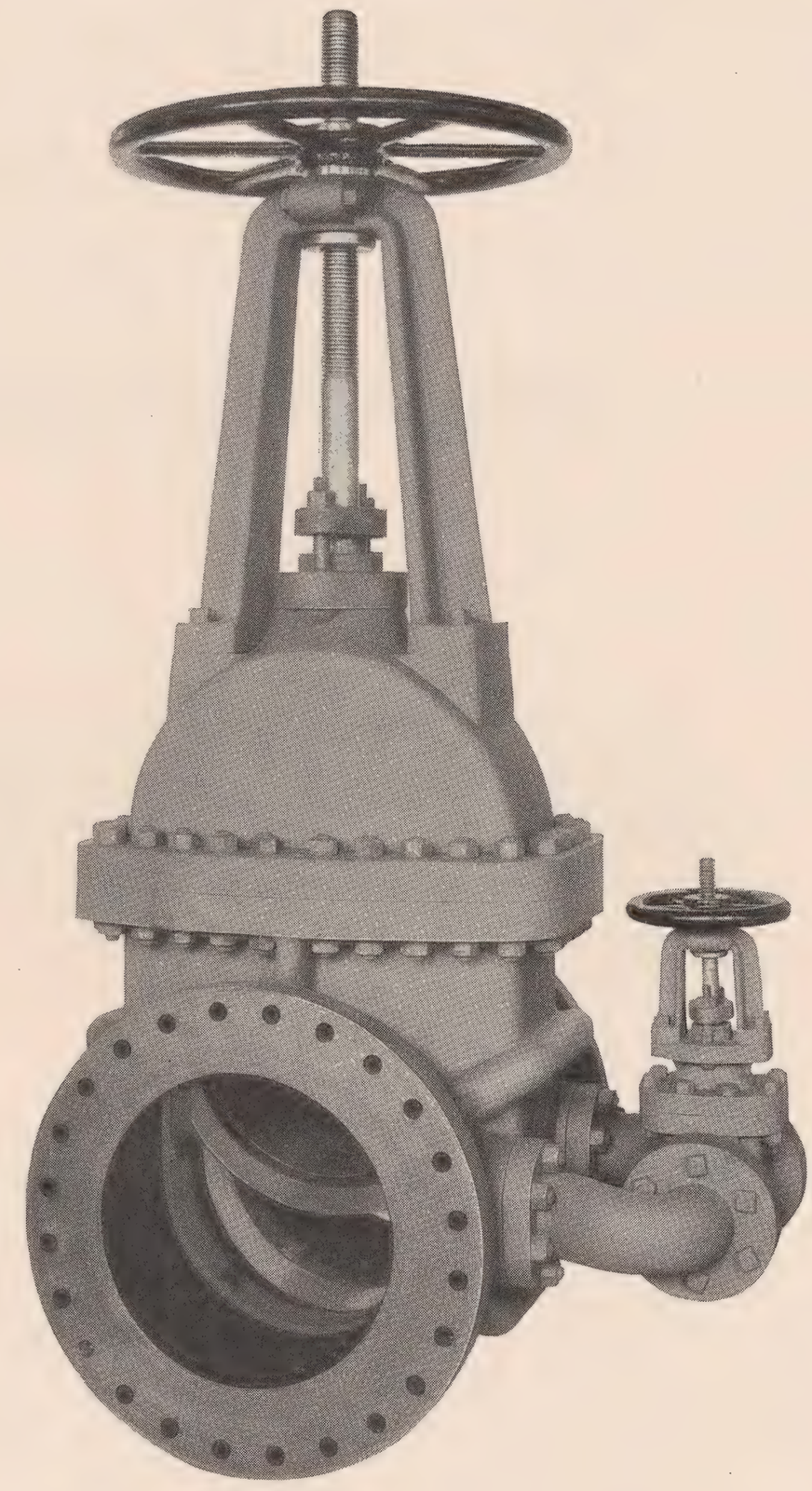
The demand has largely increased in the past few years, due in great measure to the improved methods practiced at the works of the Mississippi Glass Company, of St. Louis, Missouri, which, in 1894, obtained the sole right to manufacture from the American Wire-Glass Company.

In the method employed by the Mississippi Glass Company the wire netting is forcibly immersed to its proposed position in the center of the sheet through the molten mass of glass while the sheet is in process of formation.

In this manner the netting obtains the maximum temperature of the molten glass on the rolling table and is thus incorporated simultaneously with the rolling throughout the sheet.

Wire-glass made under this method by the Mississippi Glass Company is now characterized by boards of fire insurance underwriters, architects and merchants as "solid wire glass," in contradistinction to the glass made under the old European methods by the "sandwich" process.

As a result of numerous severe tests by fire insurance officials, "solid wire-glass" is recognized by boards of underwriters of all the chief cities of the country as fire retardant; an acceptable light in skylights (without an over-grating or under-netting), fireproof doors and elevator shafts; in windows in lieu of fire shutters, and for various other uses when placed subject to their approval and under their rulings.



VIEW OF CRANE'S EXTRA HEAVY IRON GATE VALVE NO. 11 E, WITH OUTSIDE SCREW AND YOKE AND BY-PASS.

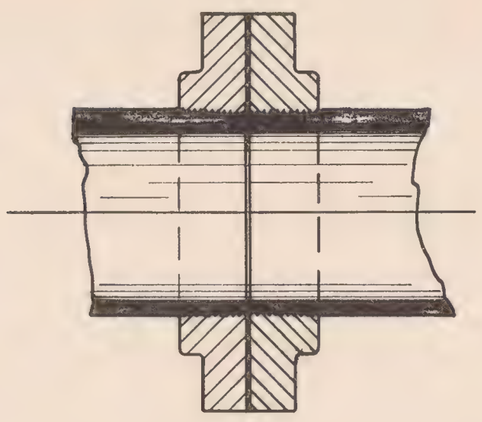
PIPING SYSTEM.

The piping system connecting the steam power from boilers to engines is undoubtedly of great interest and value to the engineering and mechanical world. It was very carefully worked out in order to secure both mobility and simplicity. The twelve boilers are connected to the main 18-inch header by twelve 10-inch ¼-bends, made of extra heavy pipe. Each one of these boiler leads is bolted to two Crane high-pressure gate valves, one valve being connected to the boiler nozzle and the other to the header. The main header (172 feet long) is made of 18-inch pipe ⅜-inch thick, with Crane's extra heavy cast-iron flanges shrunk on as shown by the detailed drawing, and is anchored in the middle to the brick chimney, the longitudinal expansion being taken up by two 12-inch extra heavy "U" bends. The header is divided into three sections by two Crane high-pressure gate valves. The engine leads are made of extra heavy pipe bent to a radius of 10 feet. Each lead is bolted to a Crane high-pressure gate valve, having outside screw and yoke, on the main header. These valves are operated from the boiler-room side.

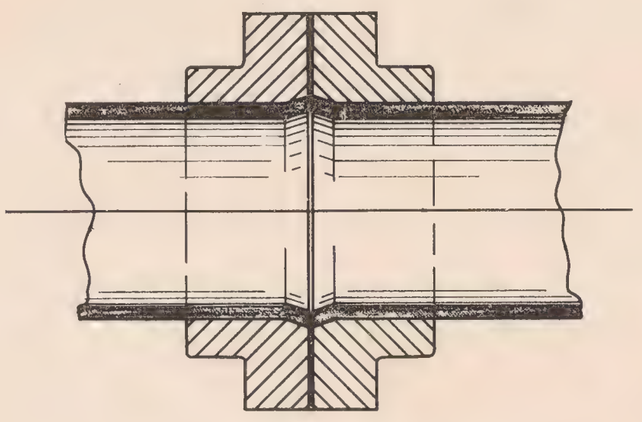
The steam passes from the boilers to the engine through pipes of easy curvature and ample area. The velocity through the engine leads, under ordinary conditions, will not exceed 2,000 cubic feet per minute.

The main exhaust line is cast-iron flanged pipe, commencing with a diameter of 24 inches and increasing to 28, 32 and 38 inches, until it enters the condenser with a diameter of 42 inches. Two atmospheric exhaust pipes are provided, one 20 inches and the other 24 inches in diameter. These pipes are fitted with Crane's noiseless atmospheric relief valves, which open automatically in case anything goes wrong at the condenser.

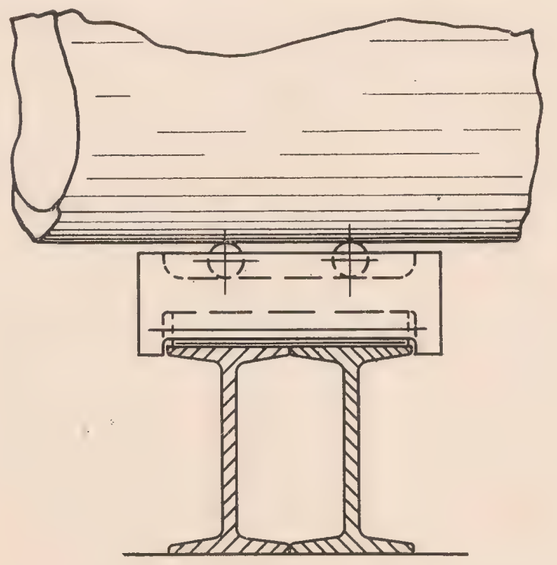
The water supply line to the condenser is an 18-inch cast-iron flanged pipe fed by two 14-inch rotary pumps, drawing from the main reservoir. The discharge from the condenser passes into a water main, circulates through some two and one-half miles of piping under ground, is taken up by two electrically driven pumps, passes over a cooling tower 130 feet high and finally returns to the reservoir from which it started.



HIGH PRESSURE JOINTS 16" and UNDER.



18" HIGH PRESSURE JOINTS

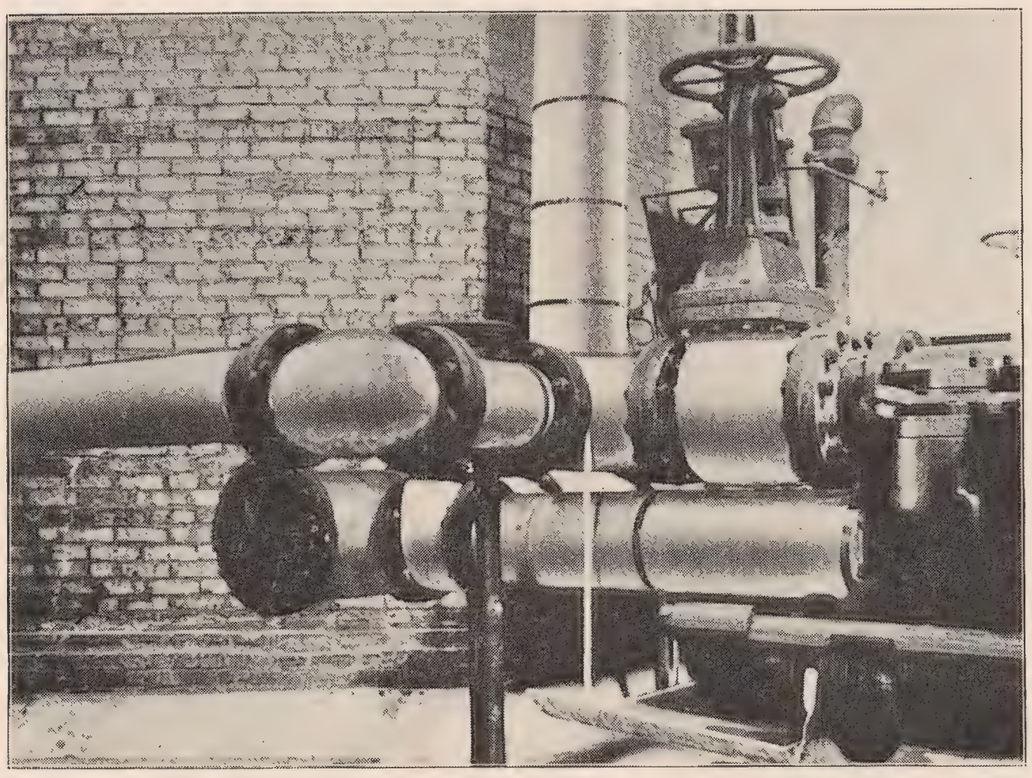


EXPANSION ROLLERS

CRANE Co.

The boiler feed pumps take their water from a heater. Into this heater is connected the exhaust from the machine shop engines, pumps and other auxiliary machines. This auxiliary exhaust line is independent of the main exhaust.

The entire piping equipment, cut, fitted and tested ready for erection, was furnished by the Crane Company. All fittings on the pressure line are Crane extra heavy flanged patterns, suitable for a working pressure of 250 pounds. The valves on the same

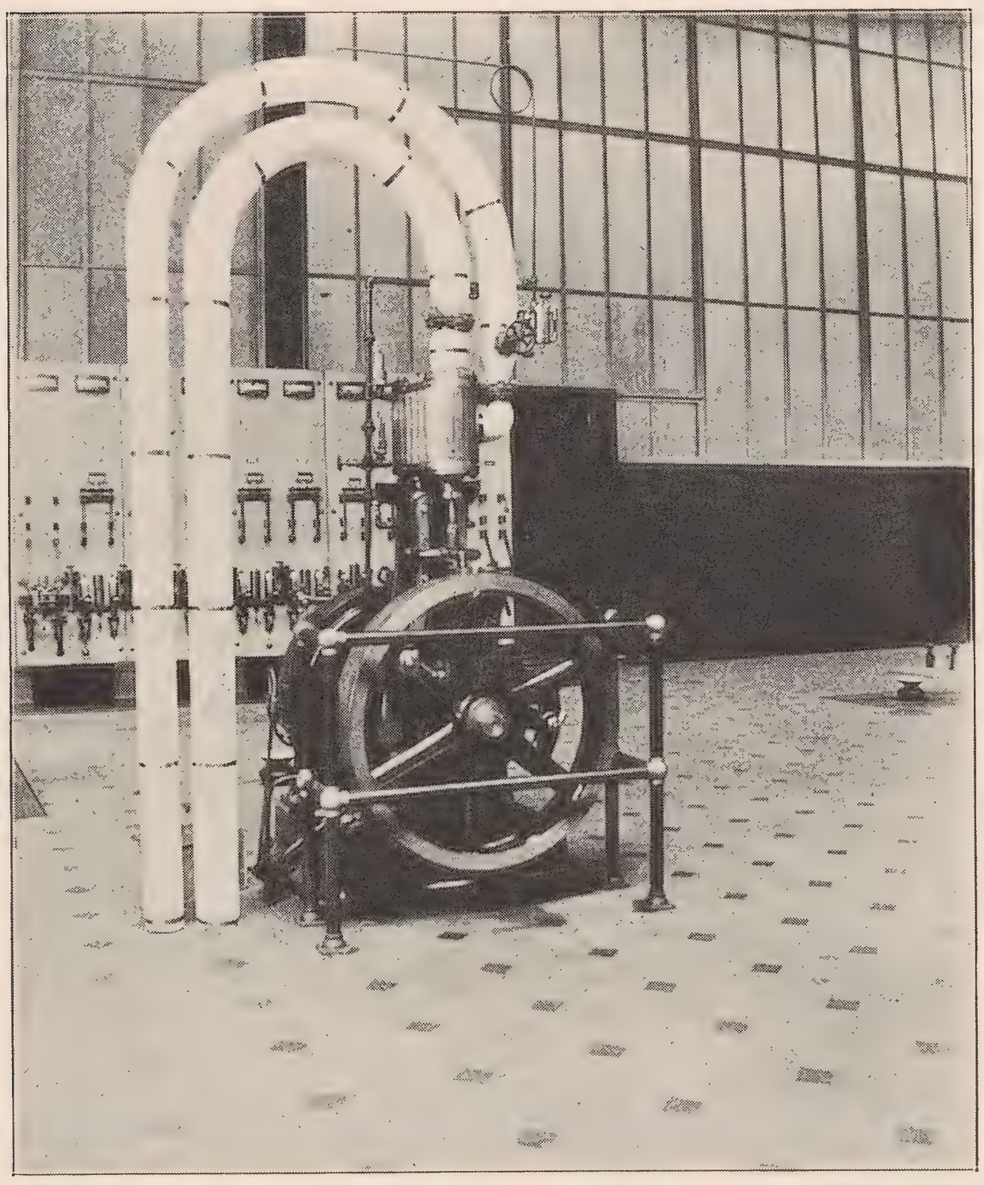


VIEW OF VALVE AND PIPING AT BOILER FEED PUMPS.

lines are Crane extra heavy gate valves, having outside screw and yoke and by-pass. (See the illustration.) On the low-pressure lines all fittings are Crane's standard flanged patterns and the valves Crane Company's standard wedged gate No. 366.

The flanges larger than 16 inches are shrunk on. Below that size they are screwed on with long taper threads. These flanges were put on as follows: Each flange was screwed on until the pipe was completely through the flange and projected slightly from the face. Then each piece of pipe was swung in a lathe, the flanges refaced and the ends of the pipe turned down flush and true. This insured both flanges being parallel and made a bearing for the gasket upon the end of the pipe itself.

This branch of Crane Company's business, namely, the furnishing from drawings of complete piping equipments for power



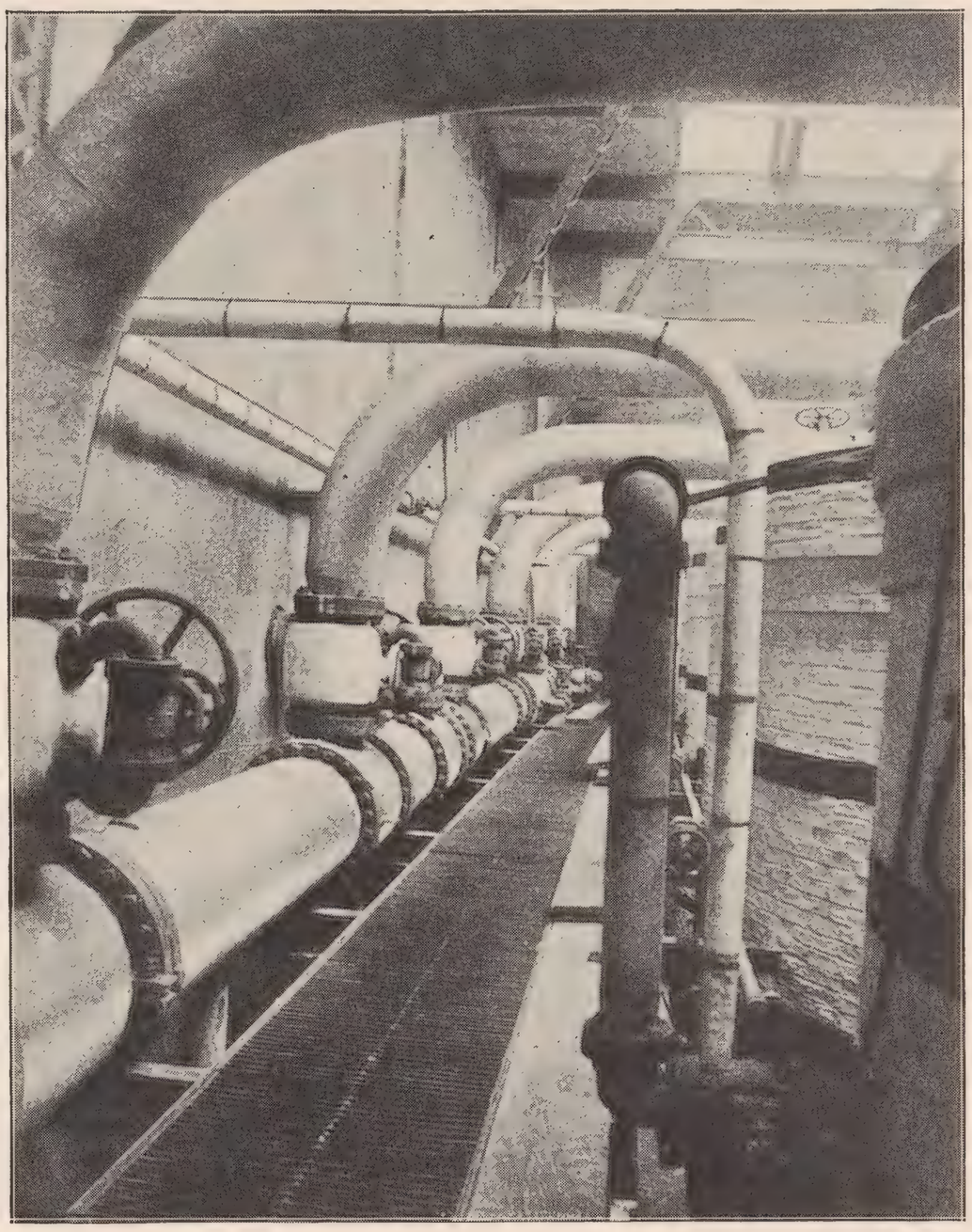
VIEW OF AUXILIARY ENGINE, SHOWING BENT SUPPLY PIPES.

plants, has become a very important one, fully two hundred and fifty plants having been furnished in the last five years in the United States, England, Ireland, Russia, Australia, Japan, Hawaii, the Philippine Islands and South African Republic. It is not necessary to add that all the work of this company is turned out with the greatest care, the pipes, joints and fittings being thoroughly tested before leaving the factory.

PIPE COVERINGS AND INSULATION.

The insulation on the steam surfaces as well as for the ammonia pipe lines in this plant was furnished and applied by the Manville Covering Company, Western representatives of the H. W. Johns Manufacturing Company, through their Chicago office, 173 Randolph street.

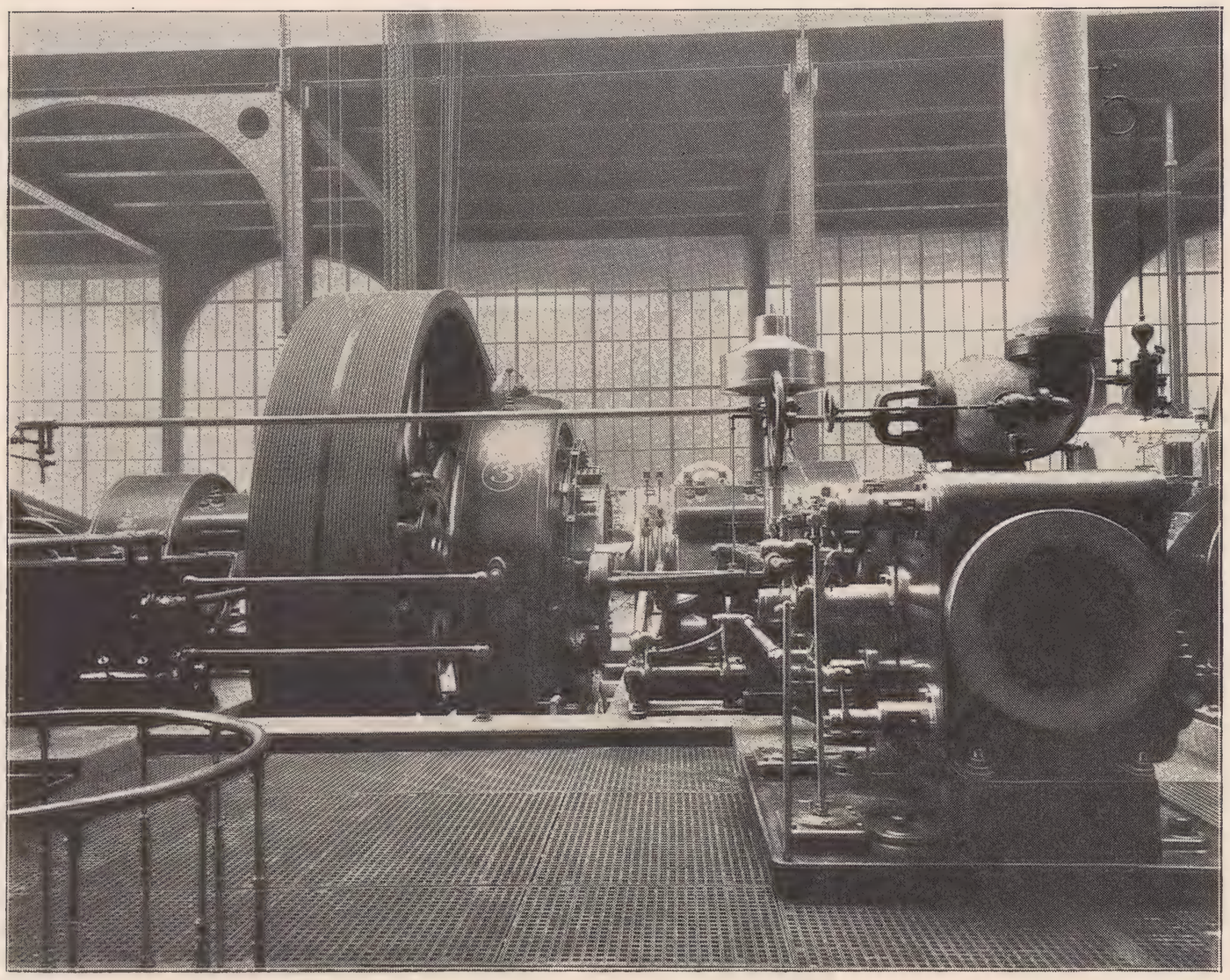
The insulation used on the steam surfaces is the well-known Asbesto-Sponge Felted Covering, which is composed of numerous laminations of specially prepared asbestos felt, suitable for the highest steam pressures, its durability being guaranteed. This material is regarded as the most efficient non-conductor of heat of



VIEW OF MAIN HEADER PIPING.

any covering suitable for the high-pressure steam surfaces. The principle of laminations for the confinement of heat has been thoroughly demonstrated to be the most correct of any construction of insulating material, not only by the most exhaustive and scientific tests made by prominent engineers, but also by its use under exacting conditions for several years. The air between the various layers of felt is absolutely confined and can neither circulate nor escape, there being no connection between the layers and no mechanically constructed air-cells or pockets. The saving to be effected depends, of course, very largely upon the conditions of the surfaces to be covered and the distance which the steam is required to be conveyed. But under the most ordinary circumstances this covering will pay for itself in the saving of fuel in from sixty to ninety days, thus affording a larger return on the investment than any other fuel-saving device which enters into the construction of any power or manufacturing plant.

Another desirable feature in the construction of this covering is that of its being possible to cover all sizes of pipes and other large surfaces in one section or sheet the entire circumference of the iron. This does away with the numerous seams in the covering, necessary where block insulation is applied, and owing to the extraordinary flexibility of the felted covering it fits tightly on the most uneven surfaces and is unaffected by expanson or vibration.



VIEW FILER & STOWELL CO'S CORLISS ENGINE, 1,000 HORSE-POWER.

This covering may be applied in any thickness desired. It is usual on surfaces carrying to exceed 100 pounds pressure of steam to have the covering made specially either 1½ inch or 2 inches thick. In this plant the headers and connections to boilers and to engines are covered with the felted covering in two layers, each 1 inch thick. This insures the most perfect insulation, the joints of the first layer being covered by the second layer.

The covering on the ammonia pipe lines consists of "Manville's" Brine Pipe Sectional Covering, made under patents of the H. W. Johns Manufacturing Company. It is made upon the same principle as the Asbesto-Sponge Felted Covering, but of different materials. This covering has long been recognized as the most efficient for brine and ammonia pipes by the owners of large packing-houses, cold storage and refrigerating machine manufacturers. When properly applied, it is proof against sweating or accumulation of ice on the covering or on the outer surface. The saving effected by its use has been computed to be 50 per cent greater than that by the application of coverings on the steam pipes.

If this covering were not used, the condensation would be so great that it would be quite impossible to run, and the heat would be great also in the condensers.

The saving of coal by the use of coverings has been demonstrated to be considerable. When the steam is at a pressure of 150 pounds to the square inch, its temperature is 366 degrees. With the temperature of the air at 60, there is a difference between the temperature of air and steam of 306 degrees. The matter of perfect insulation is thus seen to be important. Experiments have proved that the actual saving of coal with the use of these coverings is 73.08 pounds per hour.

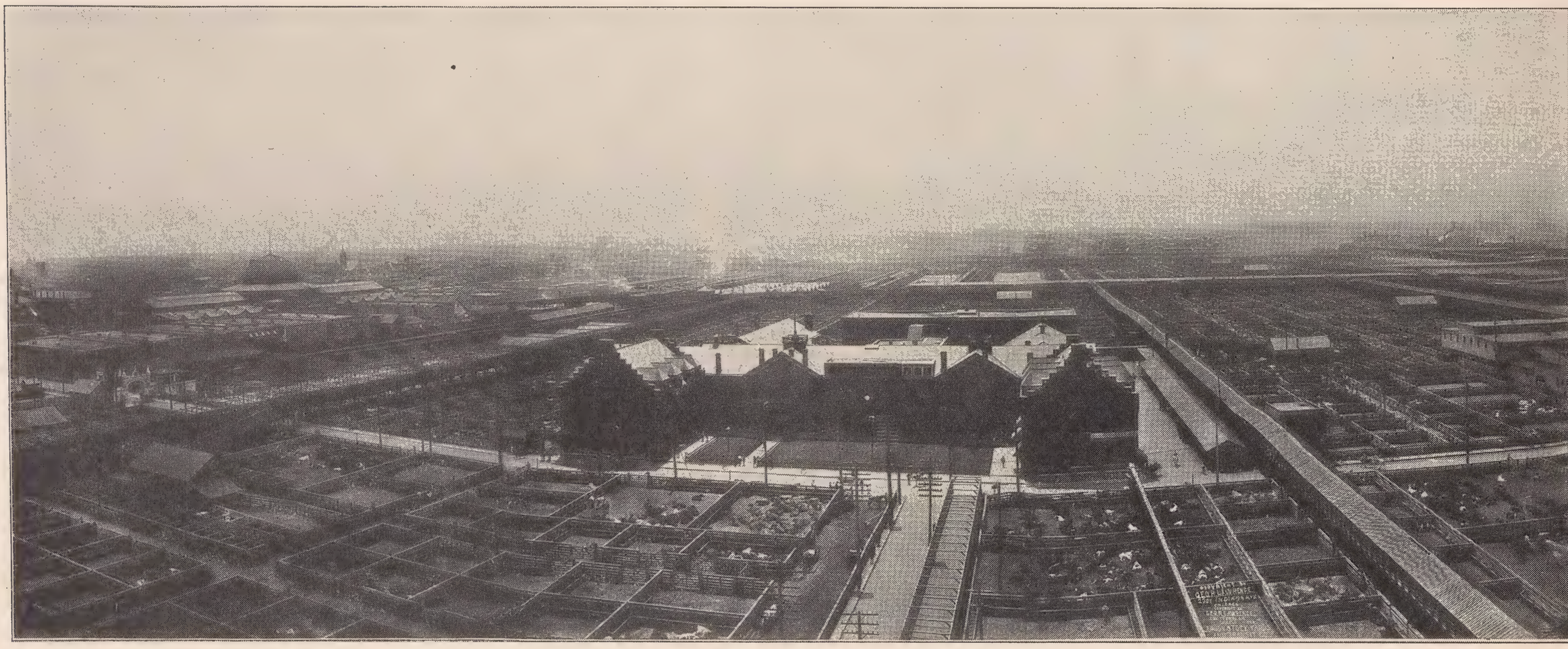
THE ENGINES.

The maximum economy of the contemporary steam engine has at the present stage so nearly approached the theoretical computed efficiency that it is very difficult of further reduction. In the last few years, however, many decided and radical improvements have been made in the construction of the automatic cut-off engine. First in preëminence among these new designs stands the Filer & Stowell Company's Corliss engine, patented and built under the supervision of its designer, Mr. J. H. Vorstman.

It is a well-known fact that most Corliss engines now being built all over the country do not meet the requirements prescribed by the increasing demand for heavy duty machines. In the Filer & Stowell Company's Corliss engine, the considerations paramount to all other details are utmost compactness of design, greatest possible rigidity of construction and increased durability of working parts.

This is not a new or untried type of apparatus, but simply a Corliss engine which is claimed to be superior to any other Corliss engine in the market as to economy, regulation, ease of access, management, maintenance, durability, appearance and workmanship; in fact, an engine constructed in accordance with the best engineering practice, and embodying in its design all such improvements as years of experience have suggested; an engine which is safe and reliable under the most severe tests.

The engines furnished by the Filer & Stowell Company, of



VIEW OF THE STOCK YARDS

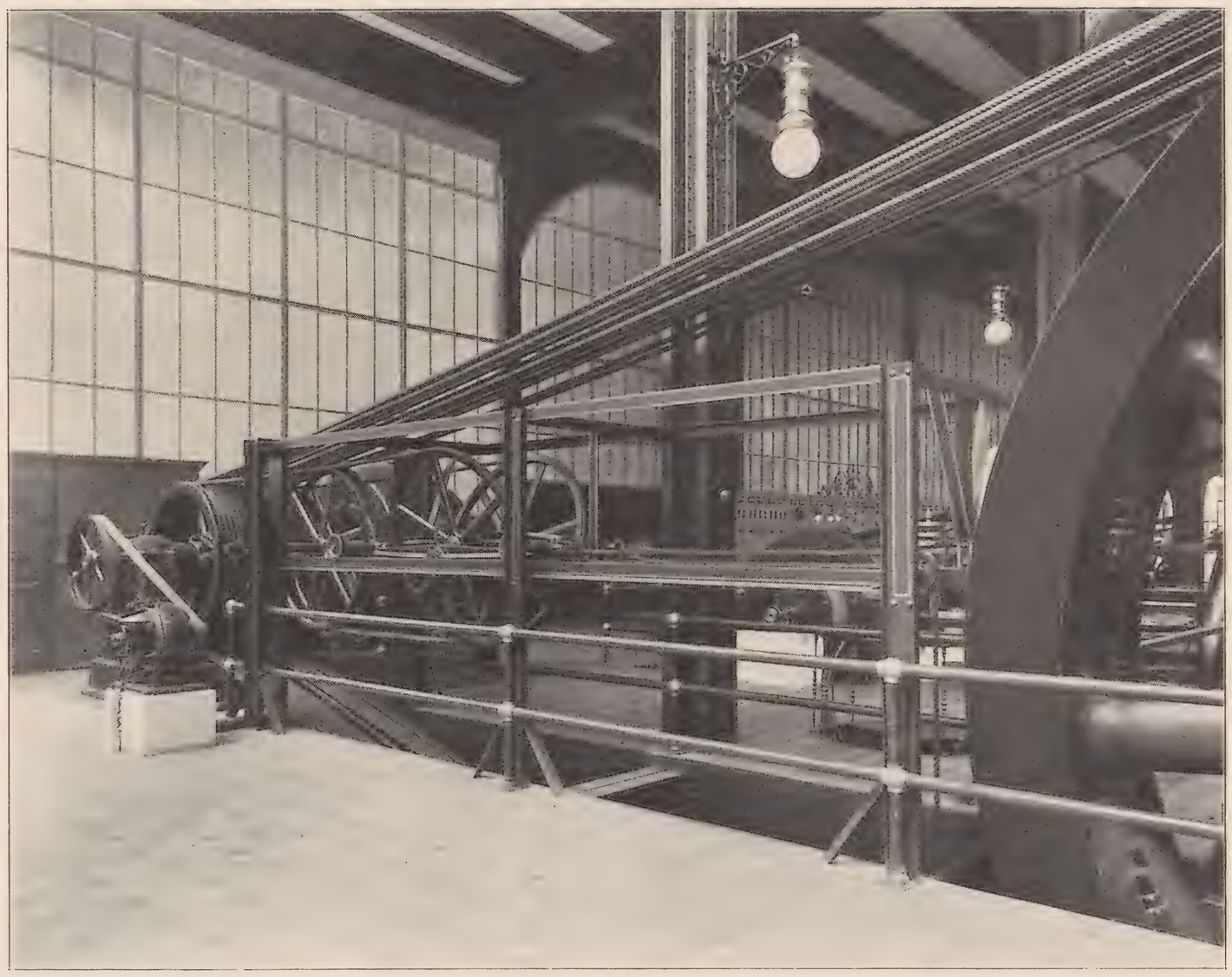
Milwaukee, for the Armour plant are of the cross-compound condensing type, direct-connected to a 500-kilowatt generator and one 3-000-light alternator, rope-driven from engine shaft. They have high-pressure cylinders 24 by 48 inches and low-pressure cylinders 46 by 48 inches. The initial steam pressure at the throttle valve is 150 pounds. These engines are to run at ninety revolutions per minute and develop a normal horse-power of 1,000 at 150 pounds steam pressure and ninety revolutions, and are capable of driving a continuous overload of fifty per cent for twenty-four hours per day. The cylinders and valve gears are of the Corliss type, both steam and exhaust ports being double ported. The steam valves and exhaust valves are driven by separate eccentrics on both the high and low-pressure cylinders. The valve gear is especially designed for direct-connected work and high rotative speeds. Noiseless vacuum dash pots are used.

The governor is of recent design and is of the high-speed, weighted type, guaranteed to regulate within two per cent from no load to fifty per cent overload, and these engines are also guaranteed to regulate within three per cent with instantaneous changes of load of fifty per cent each side of normal. The patented safety attachment is applied to the governor. and this attachment is entirely automatic in its operation and requires no attention from the engineer.

The wheel is of the built-up segment type, turned for thirty 7/8-inch ropes, as the 3,000-light alternator is driven from this pulley. The ropes have a velocity of 5,089 feet per minute. The weight of the wheel is 80,000 pounds. The main bearings are 19 by 40 inches, the crank-pin is 7 by 7 inches and the cross-head shoes have a bearing surface of 336 square inches each. The shaft is made of Bethlehem open-hearth steel, hydraulic forged and annealed. It is 21 inches in diameter in generator and wheel.

The frames are of the heavy duty "1900" type, the pillow block, frame and guides being all in one casting, and it is a very massive construction throughout. The cross-head guides are bored concentric with center line of cylinder. The main bearing shells are provided with both horizontal and vertical wedge adjustment. The receiver between the high and low pressure cylinders is of the vertical reheating type. The total weight of each engine is 265,000 pounds.

The Filer & Stowell Company are to be complimented on the trueness with which these engines are running, and which is demonstrated by the actual work accomplished and praised by the engineers in charge and also by photographic illustration taken while the engines were in action to their full capacity.



OLD COLONY TRANSMISSION-ROPE DRIVING A 350-K. W. ALTERNATOR.

THE "OLD COLONY TRANSMISSION-ROPE" DRIVES.

Power transmission is now so generally accomplished by means of rope drives that it is not necessary to enlarge on the advantages of this method of transmission, which are well known to all. The details of rope manufacture, however, are not generally understood. In this connection it is well to consider that there is as much science in the construction of a good rope and its adaptation for a drive as in any other branch of manufacture. A poor

AND PACKING HOUSES.

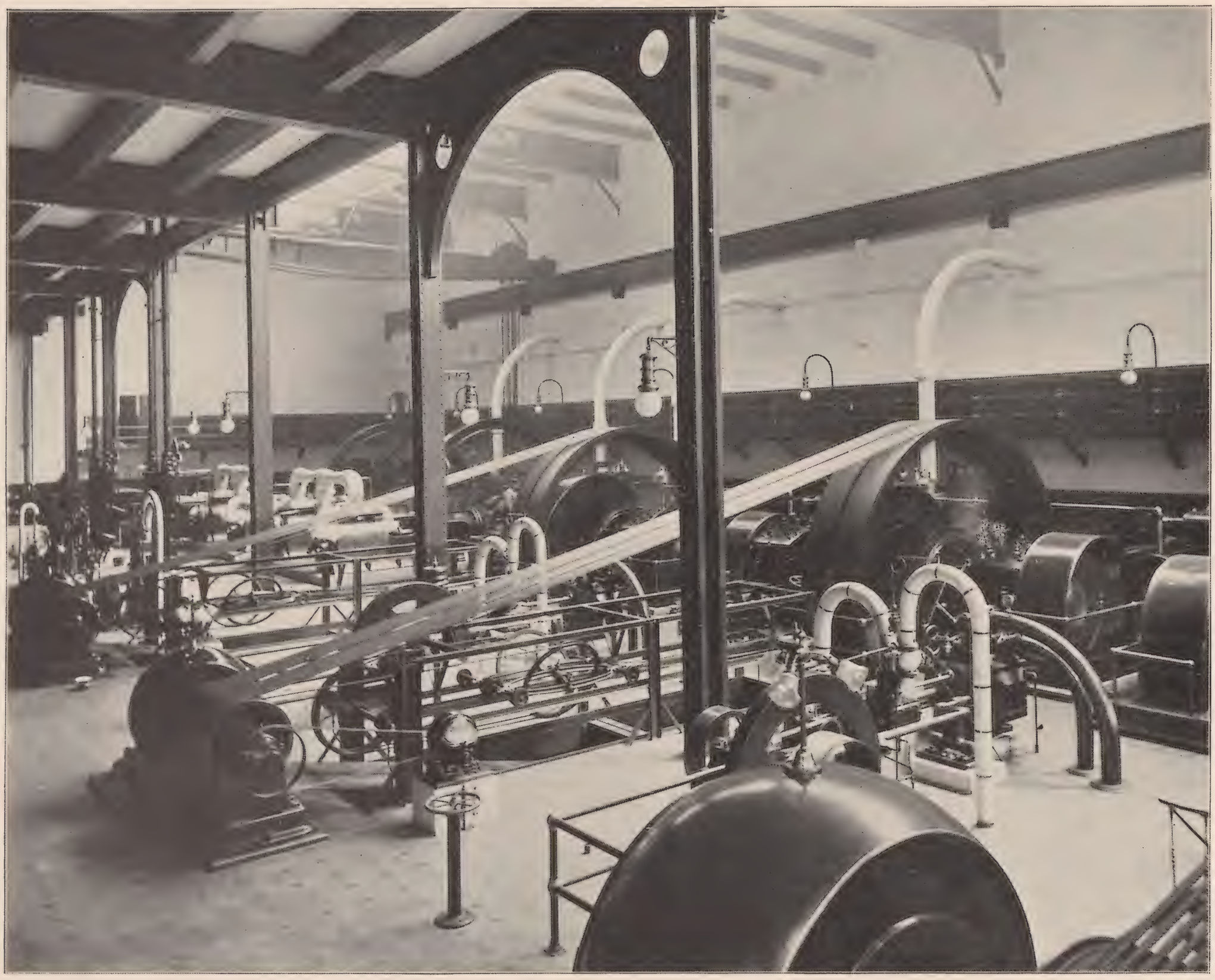
quality of rope is dear at any price and the wisest economy lies in buying the best.

The art of rope-making lies first in the selection of the material. In the best ropes, such as those furnished for the Armour plant by George B. Carpenter & Co., manila hemp is the only suitable fiber, and in selecting this material only the choicest specimens are taken. Not only so, but the best portion of the fiber is used.

The wear on the rope is internal rather than external. It is comparatively easy to protect the exterior from abrasion, but the fibers within the rope, being subjected to chafing against each other in the constant change of position from circular to horizontal, soon become ground to powder, and the rope, while apparently whole, is found but the merest shell. The best method of obviating this difficulty is to lay the fiber up in a special lubricant, the base of which is refined cylinder tallow. This lubricates the yarns of the rope and prevents internal chafing and wear. It lodges in the hollows and uneven places of the fibers and lubricates the threads of the rope. The tallow makes the rope partially waterproof.

This rope as used in the Armour plant and described in the foregoing paragraphs is known to the trade as "Old Colony Transmission-Rope," of which George B. Carpenter & Co., 202-208 South Water street, Chicago, are the agents. In the illustrations of the engines, some of the pictures were taken while the machinery was in motion, and one may perceive the running evenness of the ropes, as smooth as leather belting. Careful tests by French scientists and by officers of the United States Navy have demonstrated that rope drives are superior to belts because the friction is less; the slip on the pulleys is decidedly less; the rope drives more smoothly and is absolutely noiseless — no squeaking or slapping. The rope is made in sizes varying from ⅜ of an inch to 2 inches in diameter, both of three and four strands, and can be had in any lengths up to 3,500 feet.

"Old Colony Transmission-Rope" drives are used at the Armour plant wherever practicable. In some instances the steam engines are direct-connected to the generators, but at the same time they drive by ropes single-phase alternators. For example, one engine drives a direct-connected direct-current generator of 850 kilowatts capacity, and also drives by ropes a 350-kilowatt single-phase alternator. Two other engines drive each a direct-connected, direct-current 500-kilowatt generator, and also each drives a 180-kilowatt single-phase alternator by ropes. This method has been found to be very satisfactory, and the rope system of power transmission for power plants may be said to be the established method.



VIEW OF ENGINE AND GENERATOR ROOM, PHOTOGRAPHED WHILE AT FULL SPEED.
Filer & Stowell Co's Engines, and Old Colony Transmission-Rope Drives.

THE REFRIGERATING MACHINES.

It was after exceedingly careful consideration of the various standard makes of refrigerating machines, especially as to their relative efficiencies, and the numerous systems employed for the production of mechanical refrigeration, that Armour & Company selected the Linde machines for their new packing-houses, both in Chicago and in South Omaha, Nebraska.

As they had formerly been extensive users of this class of machinery, they appreciated the utmost importance of the constant duty required of such a machine, and of the frightful loss of provisions entailed by its failure to perform that requisite duty, and it was obvious that they should procure only that high-standard machine in which was incorporated the essential features — durability, economy and simplicity.

In the Chicago plant two Linde refrigerating machines, each with a capacity of 450 tons of refrigeration for each twenty-four

TOP OF WATER TOWER, DELIVERING WATER OUT OF PIPES 200 FEET LONG

hours of continuous operation, were installed; in the South Omaha plant, one 450-ton Linde. These machines were designed, built and erected by The Fred W. Wolf Company, engineers and architects, of Chicago.

As this article is confined to the description of the former plant, we shall refrain from further referring to the Omaha plant, having done so merely for the purpose of bringing to the reader's notice the magnitude of this order for refrigerating machines, as at the time of its acceptance by The Fred W. Wolf Company it was the largest contract ever awarded for this class of machinery, the three Linde refrigerating machines having an aggregate expenditure of about $5,000,000 for ice alone, delivered in Chicago, at about $1 per ton only.

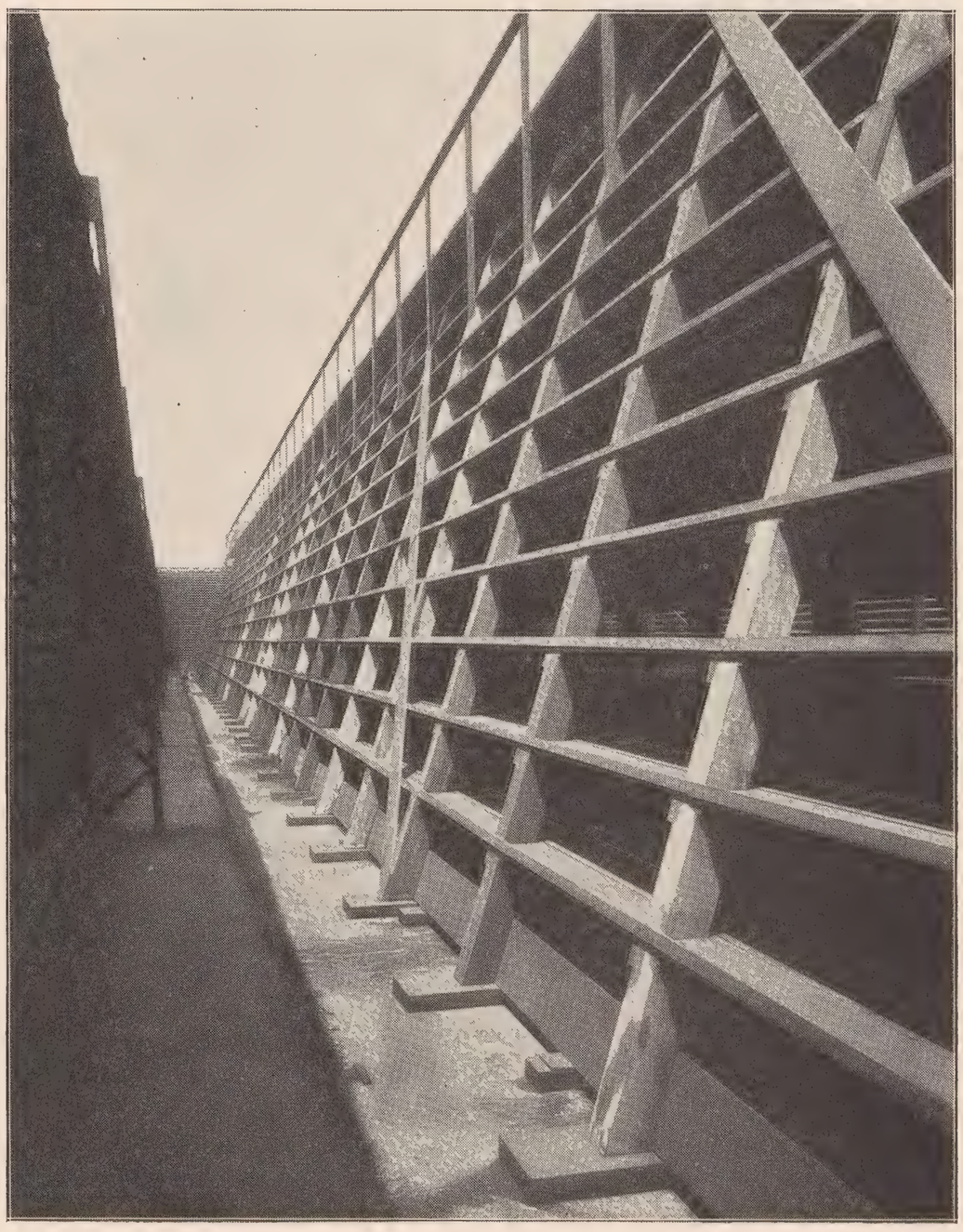
A glance at the inserted half-tone illustration presents a very complete view of this model power plant. This view, taken from the north end of the engine-room, shows the two refrigerating machines in the foreground, and between these two machines and the north wall provision is made for the installation of two more machines, at some future time, with an equally large capacity.

These machines are known as the Linde Compound Tange Horizontal Refrigerating Machines, the word "compound" signifying merely that the steam cylinders are cross-compounded, and not the ammonia cylinders. Each 450-ton machine consists of two pillow blocks placed parallel, which furnish the bearings for the 16-inch crank shaft. On the west end of these pillow blocks are bolted the guide sections containing the ammonia cylinders, and also the guides for the cross-heads. On the opposite end of the pillow blocks are bolted the steam cylinders with the engine cross-head guide sections, this style of construction being recognized by eminent authority as the most effective and efficient that is possible, as it allows the direct force of the steam piston to operate upon the ammonia piston without the first being transmitted to and through the crank shaft, thereby reducing the friction to a minimum.

The high-pressure steam cylinder is 26 inches in diameter, with a stroke of 48 inches, and is supplied with steam through a 10-inch live steam pipe. Between the high-pressure cylinder and the low-pressure cylinder is located a receiver, which is 36 inches in diameter and 86 inches long, the exhaust steam from the high-pressure cylinder being delivered to the receiver through a 12-inch pipe and, after being reheated, the steam passes over to the low-pressure cylinder through a pipe 14 inches in diameter. This last named cylinder is 48 inches in diameter and 48 inches long, discharging its exhaust steam through a 16-inch pipe to the exhaust steam condenser.

The 16-inch crank-shaft, referred to above, is of the straight pattern, with the cranks shrunk on at either end, the 20-foot fly-wheel with its 53,000 pounds of weight being bolted on at the center directly between the bearings. The reader will readily appreciate the advantage that this style of crank-shaft affords, when compared with those shafts containing as many offsets as cranks, with the fly-wheel at one end and the power supplied at the other, thereby causing a continuous forward and backward strain on both the shaft and the cranks, affording serious complications and losses — a common occurrence with shafts so constructed. The crank-shaft, together with cranks, pins, connecting-rods and cross-heads, are of drop-forged steel, each with ample proportions and strength to perform the duty devolved upon it. The bearings, both for the crank-shaft and connecting-rods, are either of phosphor-bronze or genuine babbitt, and each bearing is thoroughly lubricated by automatic oil cups. All the moving parts of these machines, with the exception of the fly-wheels, are highly polished, thereby presenting an excellent example of high-class workmanship. The cross-heads are of the solid type, fitted with adjustable shoes, providing for any wear that may take place through the neglect of proper lubrication or attention.

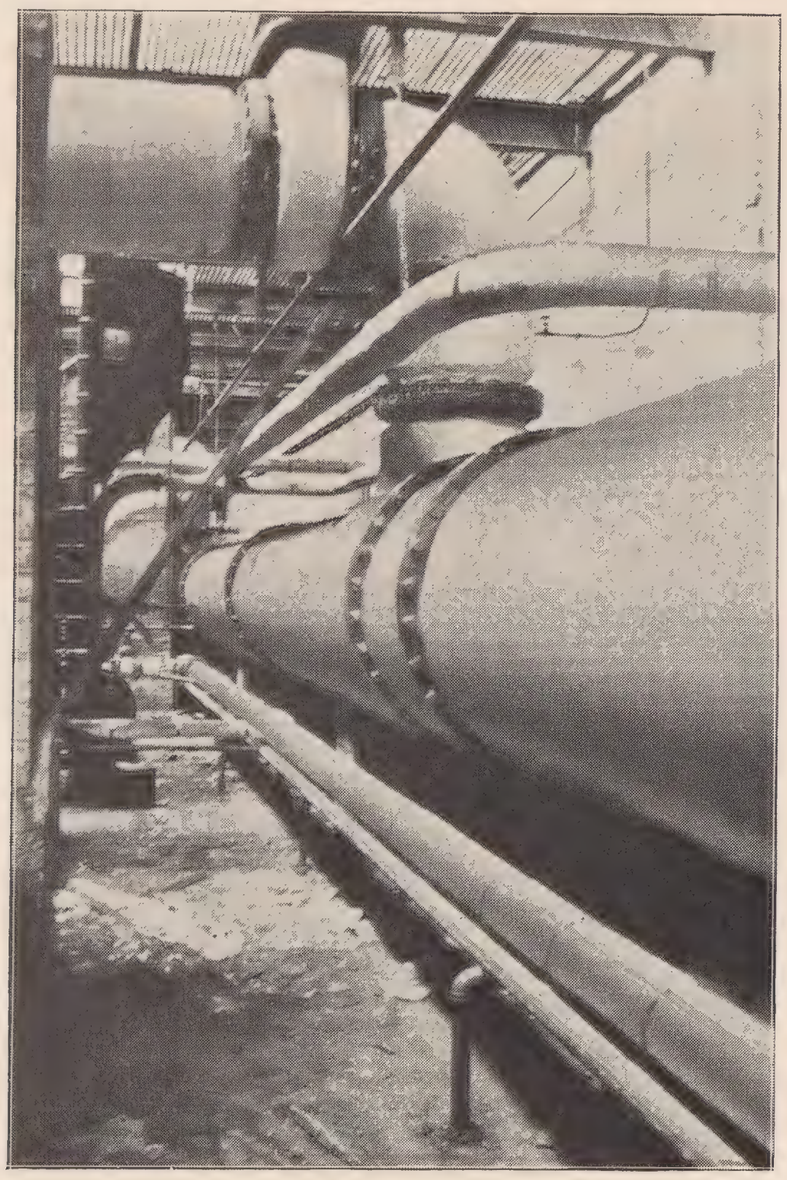
Before describing the ammonia cylinders, we would suggest that the reader once again refer to the illustration and particularly notice the construction of this end of the frame, which is known as the Tangye type. The manner in which this frame is designed allows the ammonia cylinder to be pressed into the center of the frame, and being arranged tandem to the cross-head guide section is made more secure by the use of stay rods, which obviate all possible danger of straining or harmful vibration. This cylinder is 21 inches in diameter and has the same stroke as the engine (both steam and ammonia connecting-rods being fastened to the same crank pin, as is observed by another glance at the illustration), and is known as the double-acting type, having two suction valves and two discharge valves located in either head, filling one end of the cylinder with gas while the other end is being evacuated. The ammonia cylinder, together with heads and conduits, are cast from a special semi-steel stock, and before leaving the manufacturers' shops were subjected to a test of 2,000 pounds hydraulic pressure before finishing and air pressure of 500 pounds after completion, which is far in excess of the pressure which they are compelled to stand in the use of ammonia. The two suction valves are located at the top of the head and the two discharge valves at the bottom, this arrangement allowing a complete discharge of all the gas and liquid, thereby avoiding any



WATER-COOLING RACK.

accumulation of gas or liquid in the cylinder, which would expand on the receding stroke and cause considerable loss in efficiency and power. These valves are readily accessible, and may be taken out and adjusted without the removal of the heads; they are made of dropped forged steel and are ground to a perfect joint in their cast-steel casing, this casing afterward being ground into the heads, which causes the valve to be absolutely tight and reliable, leaving practically no clearance whatever between the cylinder head and the piston at the end of each stroke. The compressor piston provided with self-adjusting packing rings is so constructed that it makes a perfect fit into the concave cylinder heads, thereby reducing the clearance to a minimum. The piston movement may be adjusted by means of a large dropped forged adjusting nut, which jams the piston rod into the cross-head.

The humid gas system is employed in the Linde machine. The quantity of this ammonia gas is sufficient to cool the compressor during compression, thereby doing away with injecting a large quantity of oil into the cylinder, which would eventually find its way into and clog the interior of the cooling coils, greatly reducing the efficiency of same. The stuffing-box, located on the front cylinder head, is provided with two sections of rubber and metallic rings. Between these sections is located an oil chamber which lubricates the piston rod and furnishes an effective seal



VIEW OF MAIN EXHAUST PIPING.

against any ammonia which might happen to find its way through the interior packing.

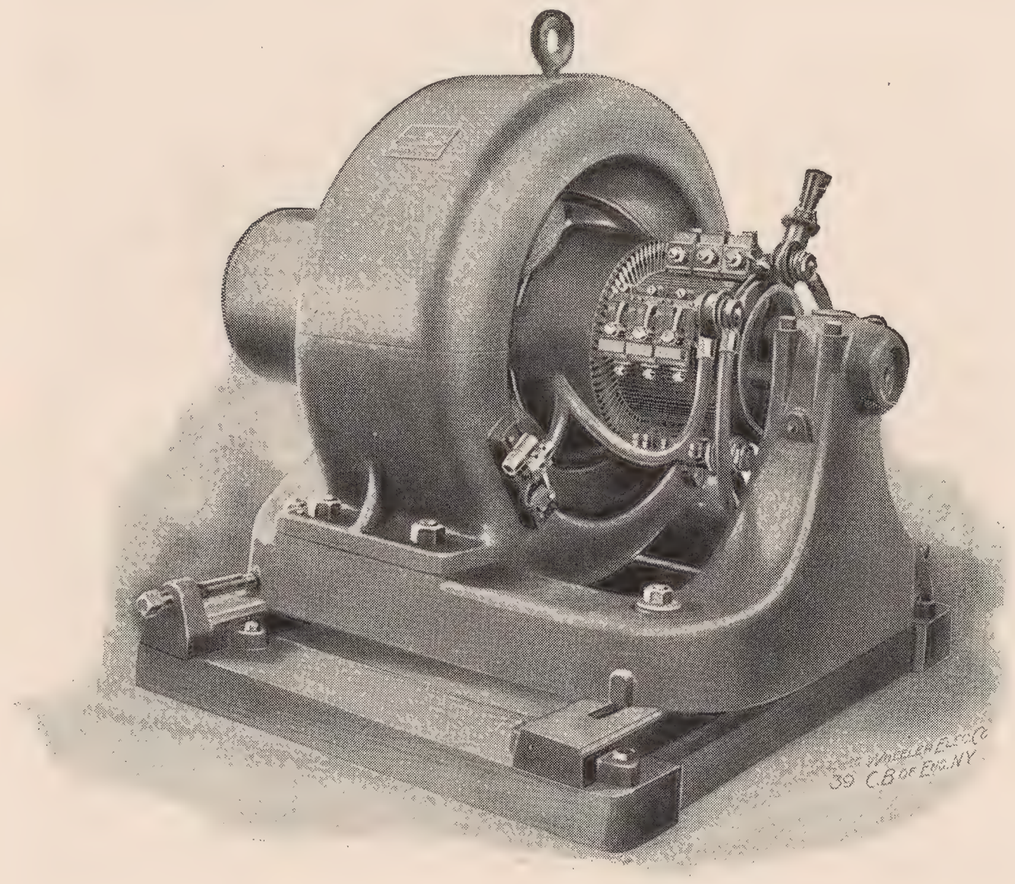
The oil for the stuffing-box gland is supplied by means of a small oil pump fastened to the frame near the front cylinder head, and is operated by belt from the crank-shaft, being so arranged that the same oil can be used continually.

The suction and discharge conduits are 6 inches in diameter and are provided with proper by-pass connections, which afford means for the pumping out of either side of the system.

The ammonia, after being compressed in the above-described cylinder, is discharged through an oil trap into the ammonia condenser. From the oil trap the oil is discharged over into an oil separator, which, as the name implies, separates the oil from the ammonia gas and allows both to be reused.

The ammonia condenser is of the atmospheric type and is probably the largest condenser of its kind in the world. It consists of ninety-six sections, each section comprising twenty-four pipes 20 feet long, making an aggregate length of 46,080 feet of 2-inch pipe, or nearly ten miles. These condensers are constructed from specially selected skelp for ammonia use.

The pipes are put together with forged Bessemer steel flanges and semi-steel return bends; the flanges are screwed on and soldered to the pipe while hot and in cooling shrunk on, the recesses on the back of the flange being then flushed with solder, thus insuring a perfectly tight joint. The condensers have galvanized water troughs with patent leveling devices and have perforated

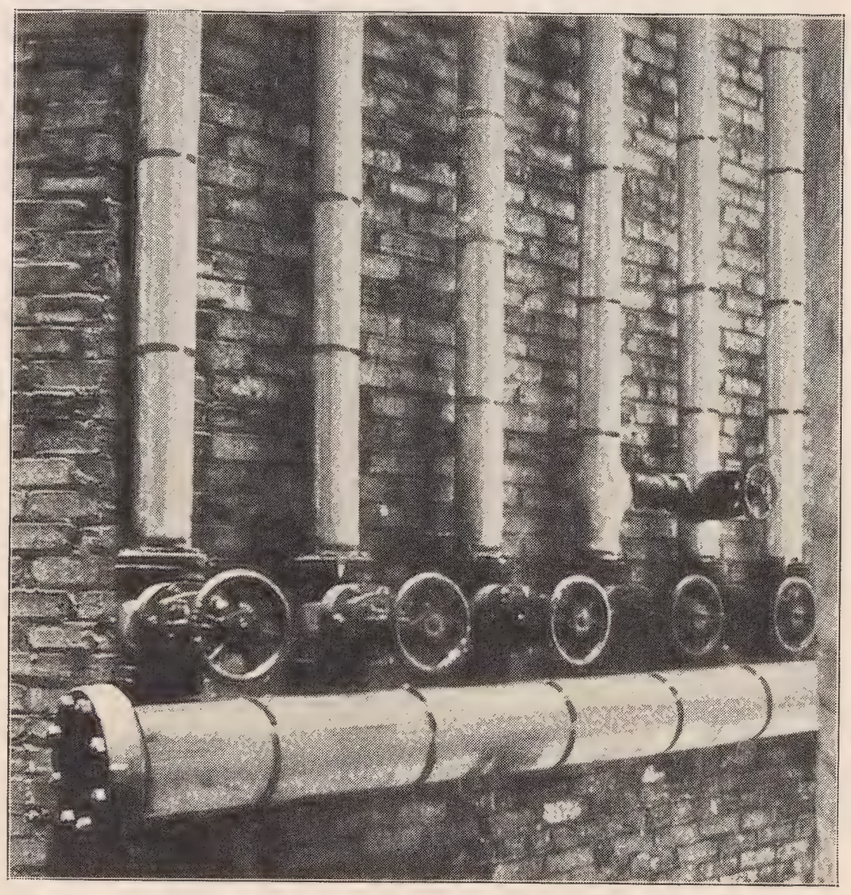


TYPE OF CROCKER WHEELER CO'S MOTOR.

steel drip strips between the pipes. By means of these perforations a freer circulation of air is obtained, thereby greatly increasing the efficiency of the cooling water.

Each section is supplied with stop valves or inlet and outlet so that any section can be shut off without interfering with the operation of the remaining sections. The condenser is also provided with an auxiliary header, which has a stop valve on each section, so arranged that when connected with the section of the compressor any section may be evacuated of ammonia without interfering with the remaining sections.

Possibly a more thorough conception of this large condenser can be obtained when the reader is informed that it requires about



VIEW OF FEED-WATER HEADER.

165,000 gallons of water per day circulating over same to remove the heat of the ammonia caused during compression. After leaving the ammonia condenser, the liquid ammonia is collected in the large liquid receiver, which is situated in the engine-room; from this receiver the liquid ammonia is delivered to the cooling-rooms, where it is expanded and the first actual work of refrigeration takes place. In expanding the liquid ammonia assumes a gaseous form and extracts from the pipes and surrounding substances the same amount of heat that is previously given up during condensation. The expanded gas is then drawn back or returned to the

compressor and again compressed and forced through the same round or cycle of operation. The piping, amounting to over seventy-five miles of 2-inch direct expansion piping, also the ammonia fittings used throughout this cold storage plant, were furnished by The Fred W. Wolf Company.

A UNIQUE SYSTEM OF COOLING.

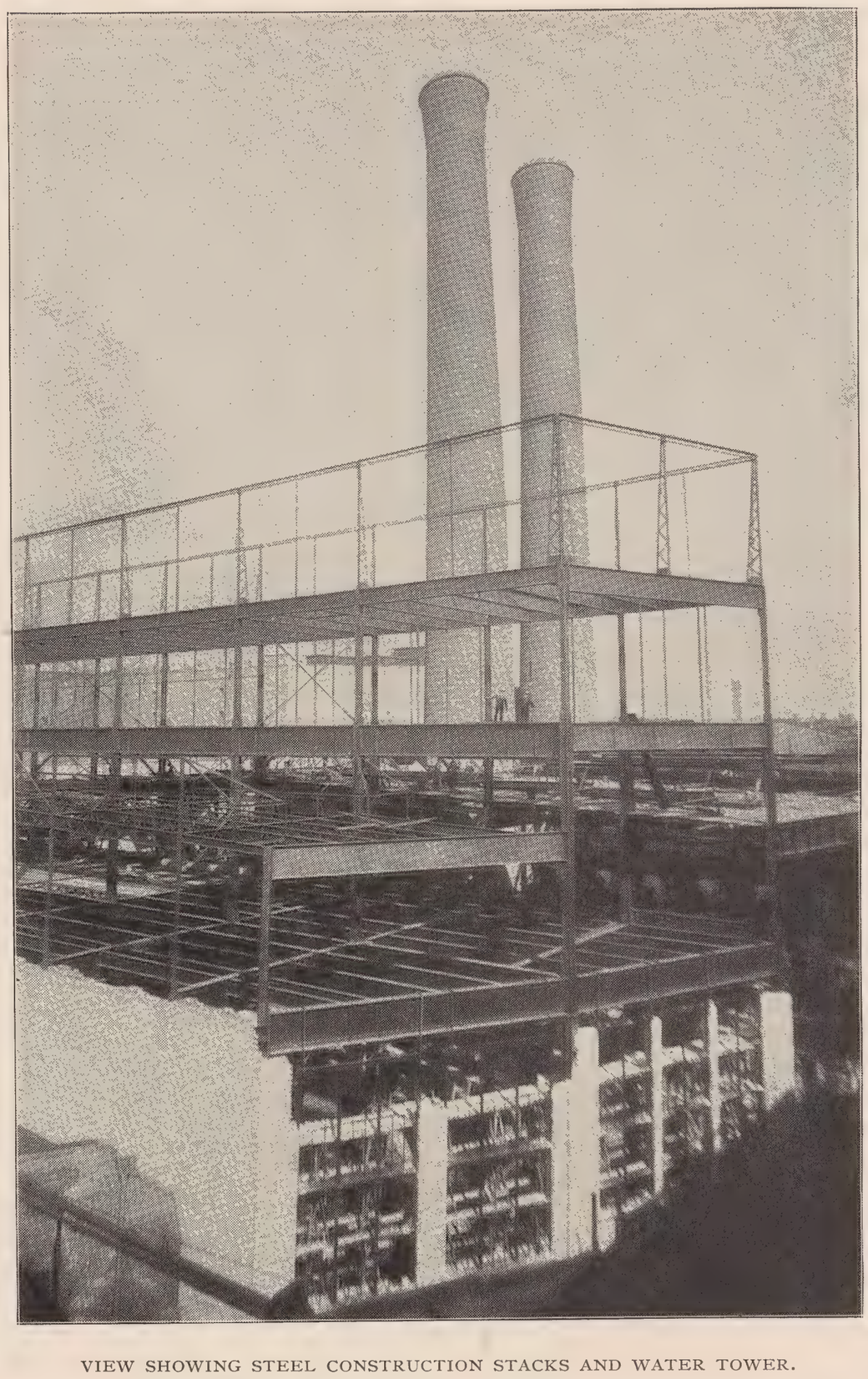
An illustration of the "cooling tower" is shown herewith. This device is something new in packing-house construction and is the invention of Mr. J. E. Smith, engineer in charge. It has served admirably its purpose, which is the cooling of the heated water from the plant. The "tower" is elevated at a height of 130 feet above grade and, as may be seen from the illustrations, consists of a series of wooden steps or platforms down which the water is allowed to flow in the cooling process. The heated water is pumped up and reaches the top of the tower at a temperature of about 100 degrees. It flows out of the pipe on to the top platform and thence down by easy stages to the bottom of the tower, where it is caught in an open pipe and conveyed downward over the ammonia condensers. In the process of falling from one platform to another — over about twenty steps — the cooling is effected by the wind which at that altitude always blows through the tower. The water reaches the lower part of the tower with a loss of about 30 degrees of heat, at an expense for this much of cooling of almost nothing.

IRON FLOORS AND STAIRWAYS.

Cleanliness, safety and durability are insured by the use of iron floors and stairways throughout the building. This construction has reached a high degree of perfection of late years at the hands of the well-known firm of Chicago manufacturers, the Hansell-Elcock Foundry Company, whose facilities for iron work are very extensive and constantly improving to every advancement in the iron industry. Their work as shown in this building is a combination of lightness and strength, with elegance of design and perfection of finish. They built the cast-iron floors around the engines, part of which are removable on short notice for purposes of repair or adjustment to the pipes beneath. These floors give the impression of perfect neatness not to be secured in any other manner and at the same time giving ventilation to the floor beneath the engines, where the steam supply pipes run. The same can be said of the walks around the boilers and coal bunkers, the balcony, the iron spiral stairways, etc. In every instance both the material and workmanship are the best for the purpose involved. In other words, iron is used where iron is most appropriate, and is adapted and wrought in the most skilful manner.

DISPOSAL OF DRAINAGE, WASTE WATER, ETC.

As the basement of the powerhouse is below the level of the main sewer in the street by about eight feet, it was necessary to provide for the disposal of drainage and seepage water and all drips and waste water about the plant which could not be drained into the sewer by gravity. For this purpose two automatic electric bilge pumps, known as Yeoman's Bilge Pumps, were installed by Edw. Yeomans, Chicago.

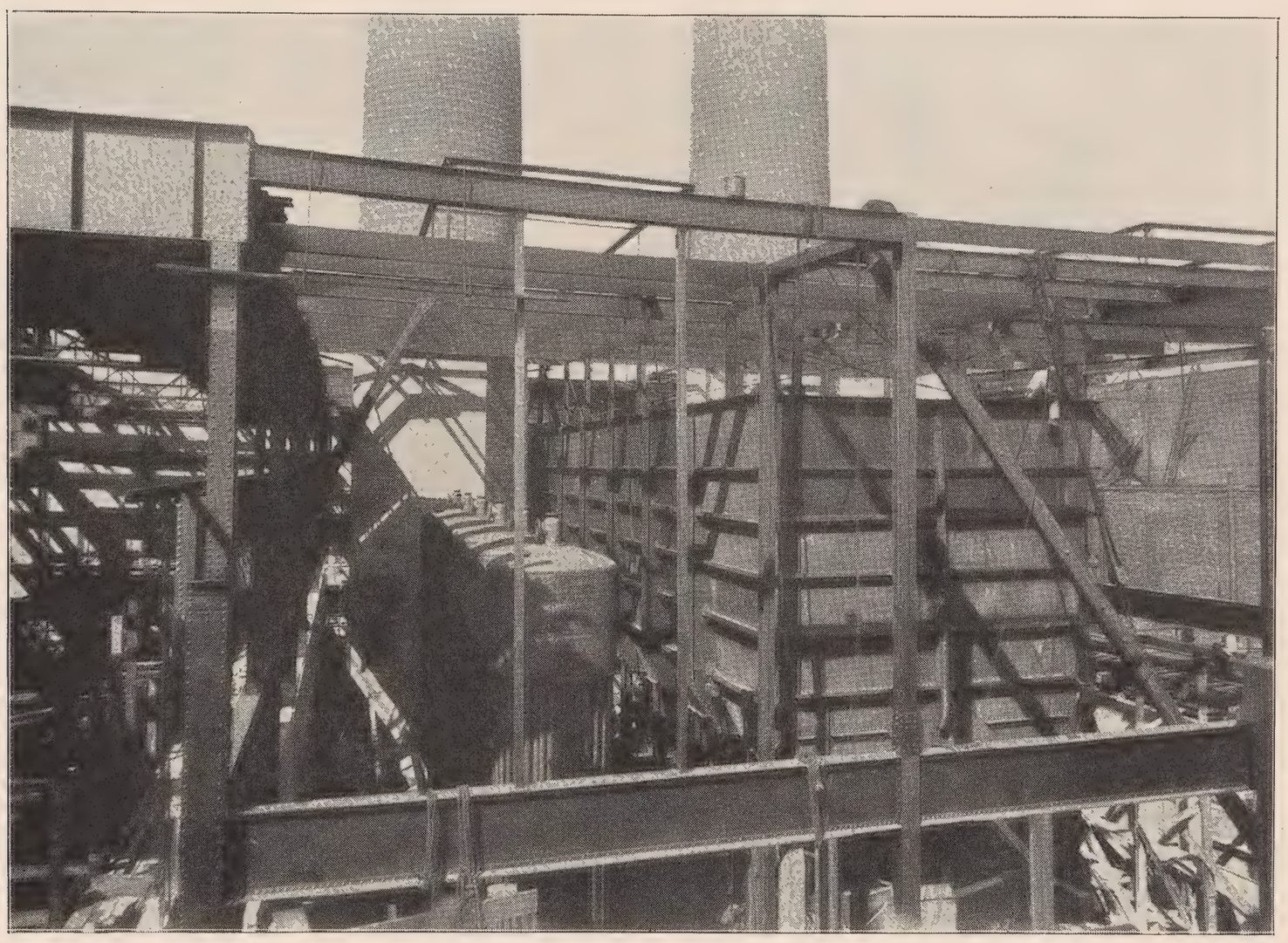


VIEW SHOWING STEEL CONSTRUCTION STACKS AND WATER TOWER.

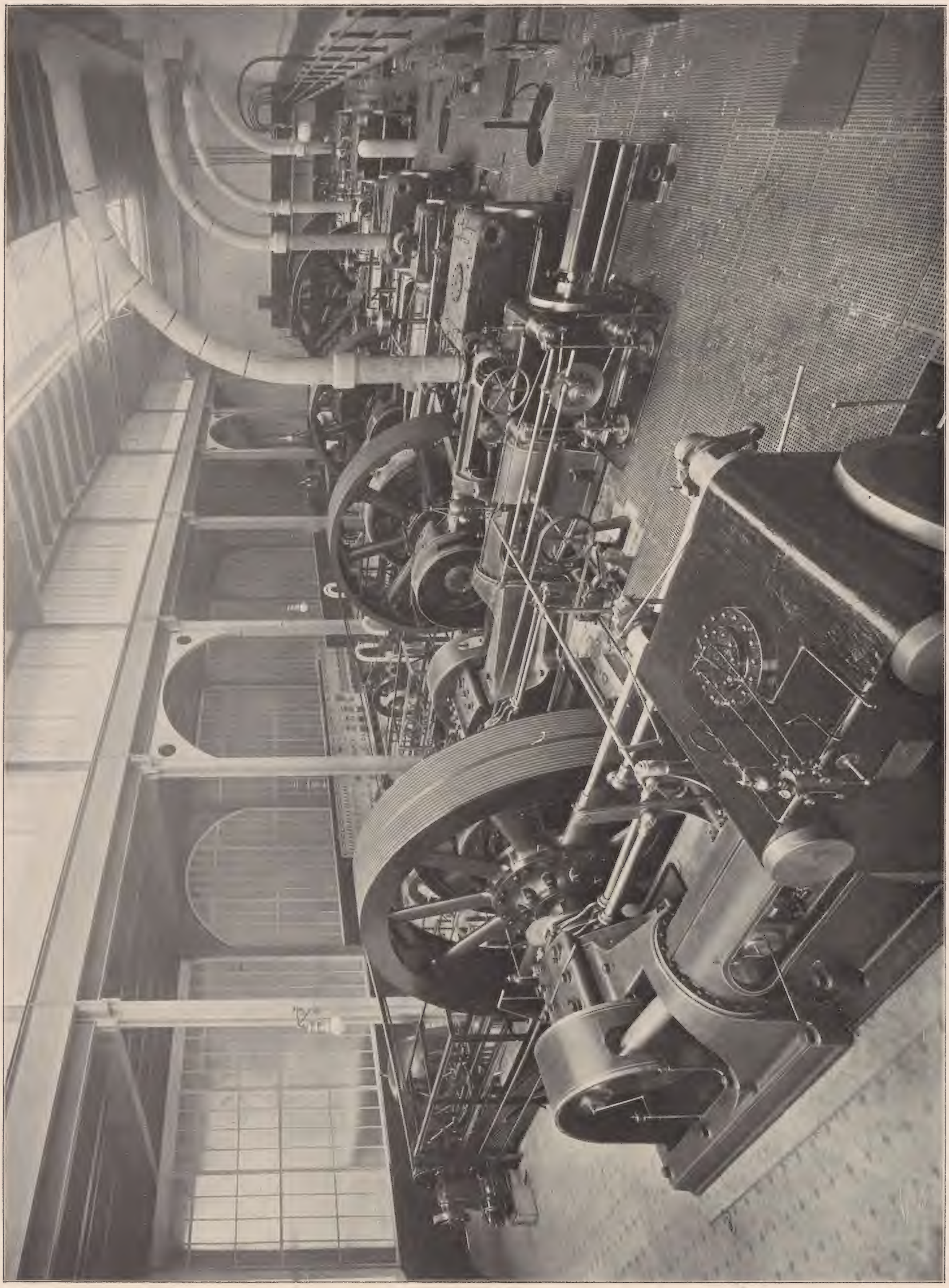
The drainage, waste water, etc., is collected in two catch basins, each three feet in diameter and seven feet deep. The motors stand directly over the catch basins on cast-iron bases, which also act as covers for the basins and are direct-connected to rotary pumps set on the bottom of the basins and therefore always submerged and requiring no lubrication. These pumps are of such a character that they will not clog or suffer in any respect from handling sand or any solids capable of passing through the discharge pipes, which are 2½ inches in diameter.

Each installation is controlled by an automatic switch connected to a copper float in the catch basin in such a way that when the water in the basin has reached any desired height the pump operates and discharges into the sewer at the rate of 100 gallons per minute, until the level is reduced to the proper degree or the basin emptied. The switch then opens the circuit and the pump stops.

The extreme simplicity and absolute positiveness of this apparatus and the minute power consumption and space requirements as compared with



DETAIL OF BOILER ROOM. STEEL CONSTRUCTION, BOILERS, COAL BUNKERS AND STACKS.

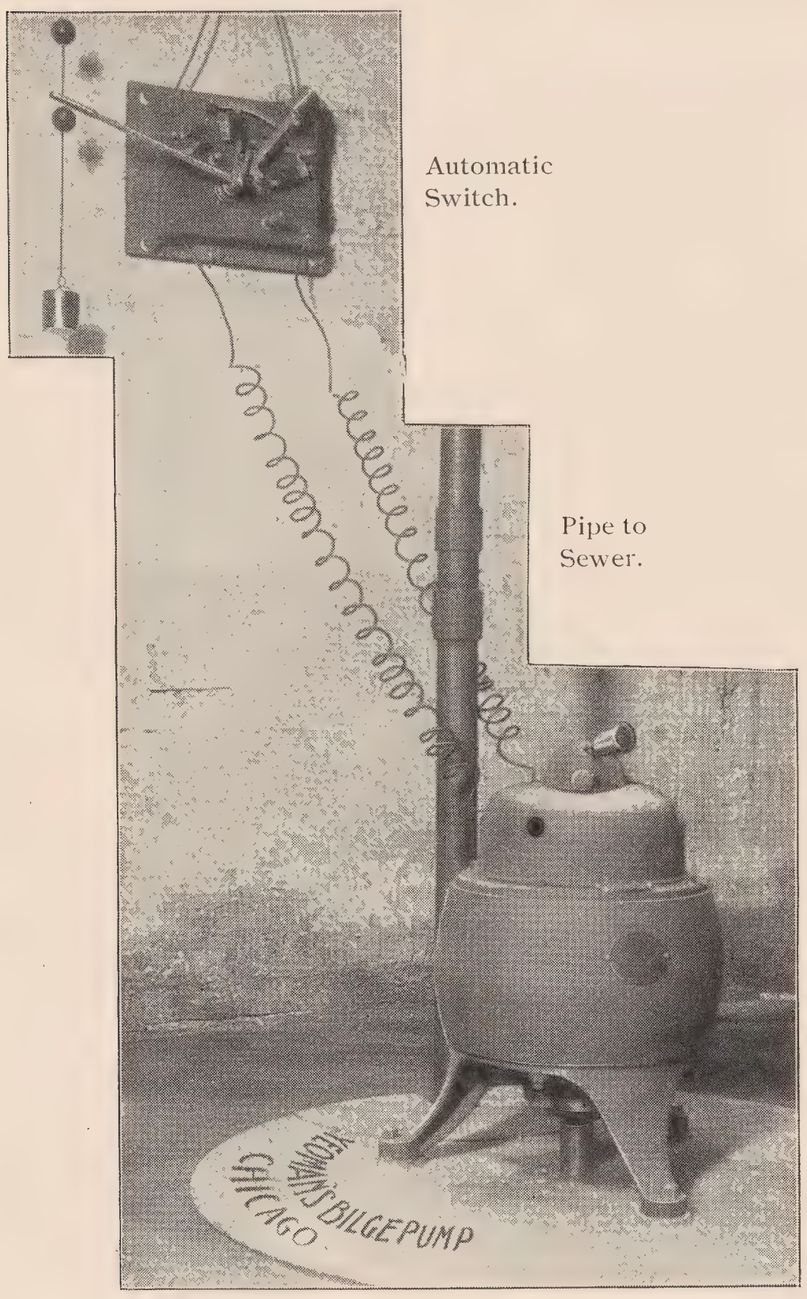


GENERAL VIEW OF ENGINE AND GENERATOR ROOM, ARMOUR & CO'S POWER PLANT.

devices for a similar purpose operated by compressed air commended it to the designer of the Armour plant.

DESCRIPTION OF THE MOTORS.

The largest proportion of the motors used in this plant are of the Crocker-Wheeler make. The motors range in size from



YEOMAN'S BILGE PUMP, CHICAGO.

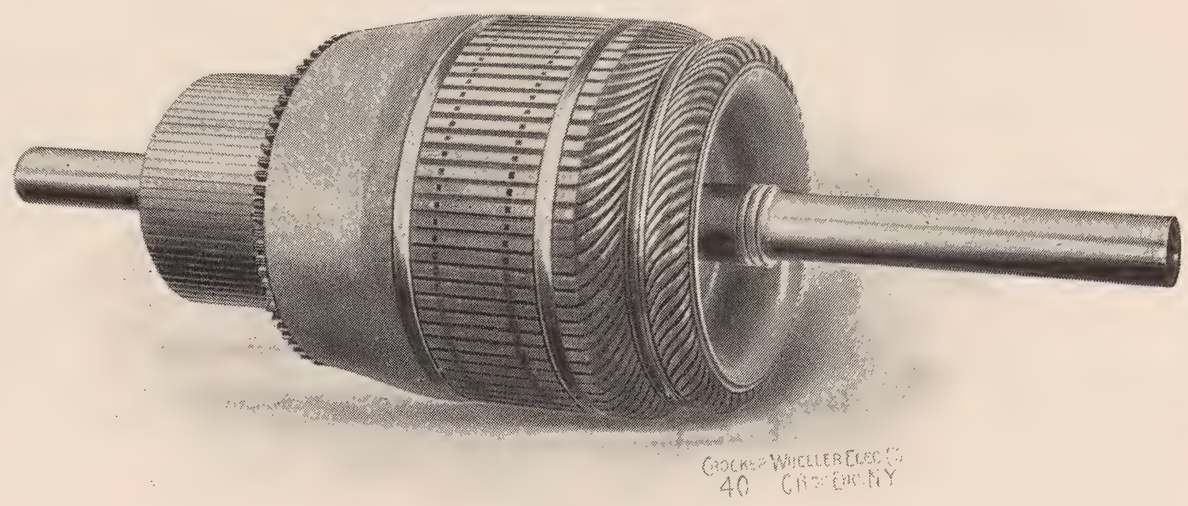
2 horse-power to 75 horse-power, and are used for every possible purpose. In the powerhouse, there are three motors, 50, 35 and 25 horse-power respectively, operating the coal conveyors; seven motors of 25 horse-power each operate elevators in different parts of the plant, and seven conveyors of different types are operated by motors varying in size from 15 to 50 horse-power. Other Crocker-Wheeler motors of various sizes to the extent of over 1,200 horse-power are used in the many different processes requiring power.

The above motors are of four-pole type, as shown in illustration, the frame being of cast iron, split horizontally, and has inwardly projecting flanges which, besides giving the frame great mechanical stiffness, affords considerable protection to the field coils. The poles are round and of cast steel, cast welded into the frame, forming a perfect magnetic joint. The field coils are easily removed by unclamping the cast-iron pole shoes.

The armature is, of course, the most important part of the machine, and to the excellence of the design and workmanship of the Crocker-Wheeler armature is due in a large measure the success of Crocker-Wheeler machines in packing-house work. The insulation throughout, and that of the armature especially, must be particularly tough and impervious to moisture, as the condition of moisture is one frequently to be met with in this class of service. The armature coils are machine-wound and, when formed into the proper shape are thoroughly taped, insulated and then placed in slots in the armature core, which slots are already insulated carefully with composite troughs of oiled muslin, mica and pressboard.

The commutator bars are of hard-drawn copper and insulated from themselves and the core with the best india mica only.

The brush holders are of Crocker-Wheeler parallel movement type, which hold the carbon brush rigidly clamped in the brush box and yet allow a movement of the brush parallel to itself only, thus insuring an always normal position to the commutator.



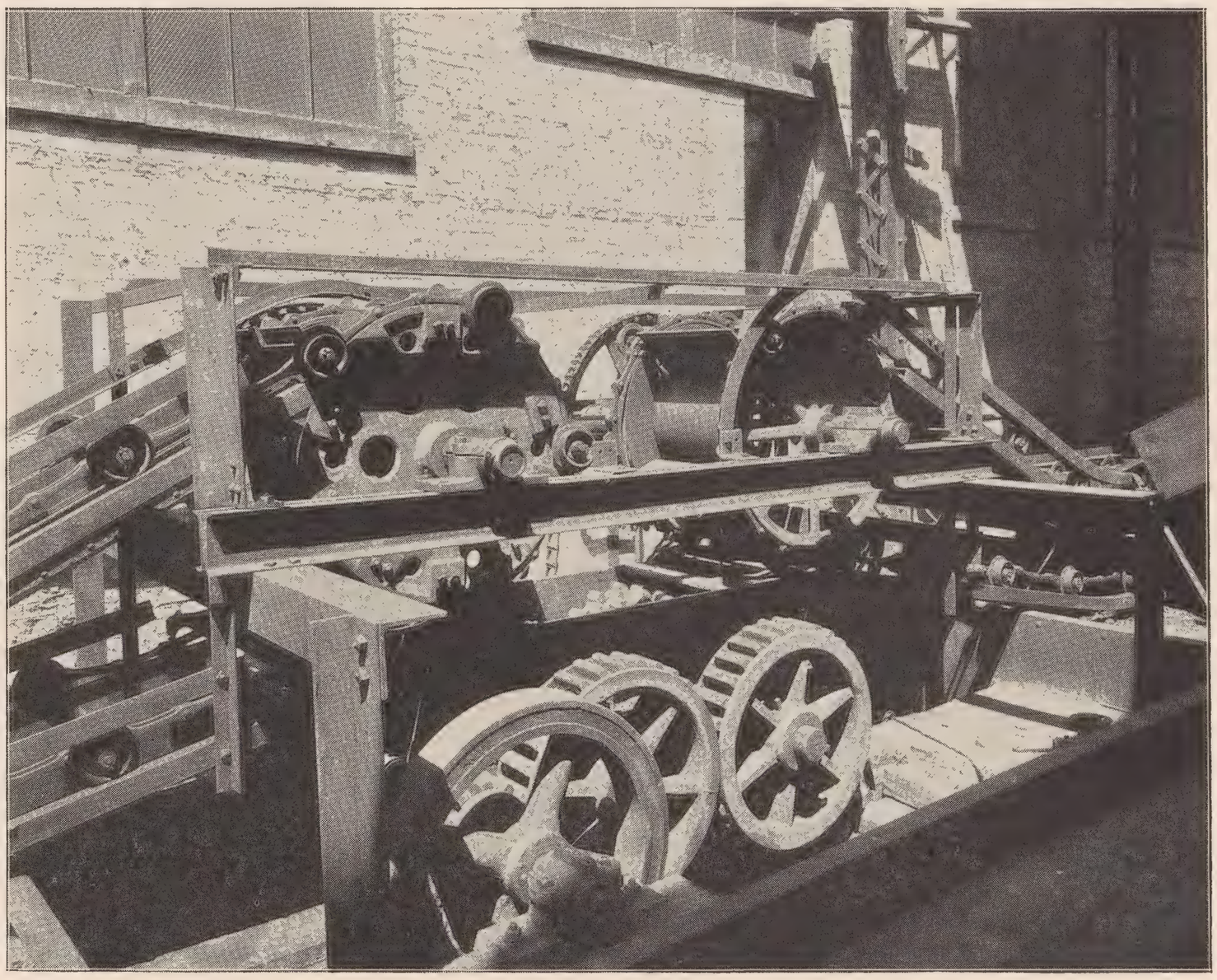
ARMATURE OF C. W. CO'S MOTOR.

The greatest of care has been taken throughout that the machines be thoroughly well constructed, which enables them to withstand the heavy and severe usage to which they are frequently put and has enabled the Crocker-Wheeler Company to obtain the enviable position it now has in this line of apparatus.

This company has been very successful in this line and has done a great deal of packing-house work in all parts of the country, having equipped throughout some of the largest houses in the great packing-house cities, notably Kansas City and Sioux City, as well as Chicago.

The following is a list of the Crocker-Wheeler motors in use in the Armour plant at the present time: One 75 horse-power, six 50 horse-power, five 35 horse-power, twenty 25 horse-power, eight 15 horse-power, one 10 horse-power, three 5 horse-power, two 3 horse-power.

In inferior grades of machines serious sparking often occurs at the point where the brushes bear against the commutator, result-

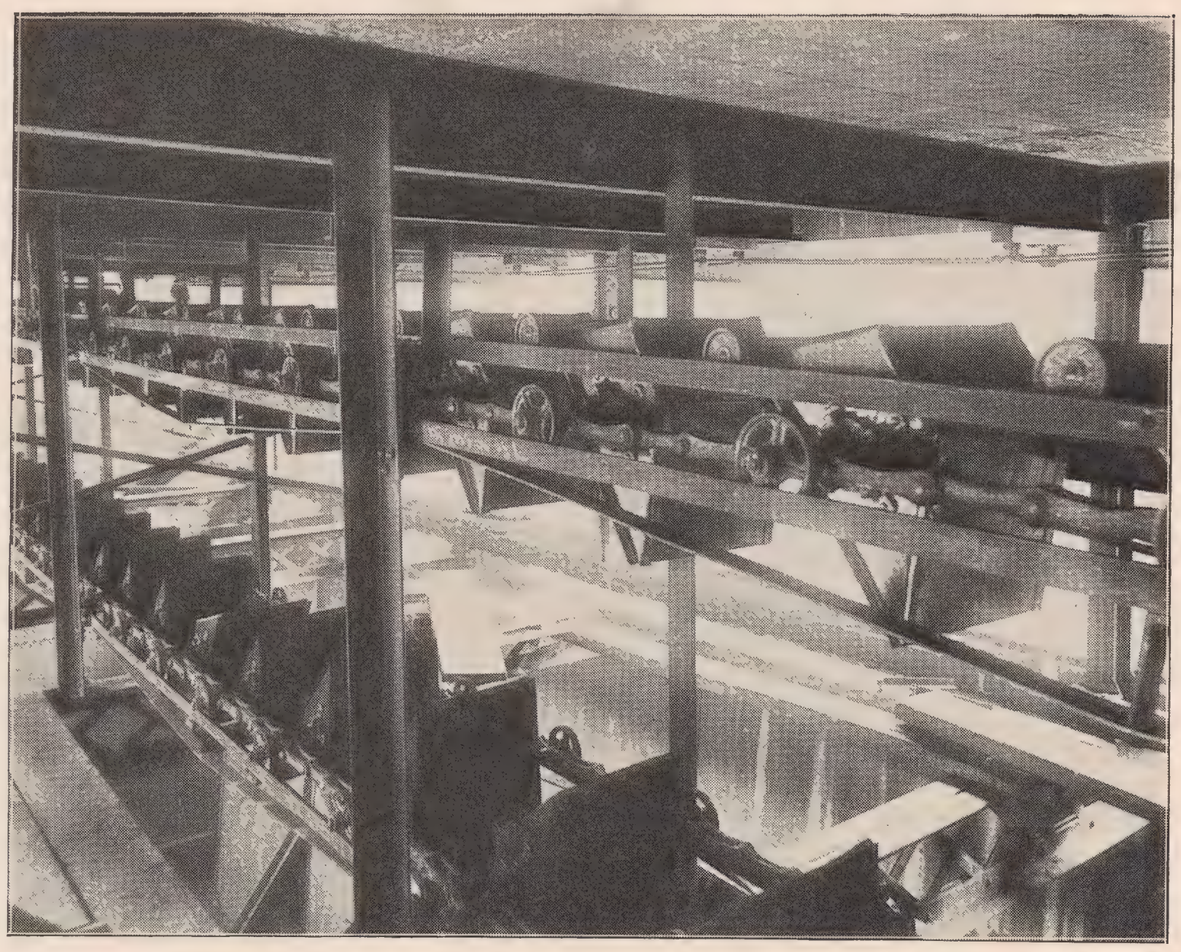


VIEW OF COAL CRUSHER OF CONVEYOR SYSTEM AT DELIVERY POINT.

ing in a rapid deterioration and disintegration of these parts, thereby causing great expense in renewing those affected. It is therefore very important that only apparatus of the highest grade be installed. Properly constructed machines will not only take the normal load without sparking, but will take large overloads for short periods without injurious effect.

THE COAL CONVEYORS.

A marvelous mechanism is embodied in the coal conveyors, by which the maximum of labor saving is obtained at least expense of time, power and money. In a plant like this, an immense quantity of coal is used, and under the old system it would be necessary to handle it all in dump carts and by hand. Think of the endless amount of dirt and dust this would entail and the number of men it would take to keep a battery of twenty-four furnaces going in the old manner, whereas now, by the use of electrically driven coal conveyors, designed and built by Charles Berghoefer, of Milwaukee, the coal is handled with certainty, dispatch and cleanliness. The only place that manual labor is required is outside of the building. Not a hand touches it from the time it leaves the cars until it is passed outside again as ashes. The coal reaches the building on railroad cars at grade and is unloaded from the cars on to an inclined platform, down which it rolls into the conveyors, which travel on the principle of the endless belt. The illustrations shown herewith will give an excellent idea of the construction. From this point the coal is carried directly to the crushers, where it is reduced to uniform size. It then drops from the crushers to a 15-foot run of the same system which carries it inside the building, where it is in turn automatically passed into the delivery system of buckets, which carry it up fifty feet to the top of the two coal bunkers, which feed the double battery of furnaces. As the conveyor buckets pass over these bunkers, an automatic catch releases the bucket and dumps the coal. It is so arranged that the coal may be consigned to either bunker as may be desired. The empty buckets return to the place of starting and take up their work anew.



VIEW OF COAL CONVEYORS AT TOP OF BUNKERS, DELIVERING AND RETURNING.

The entire system is worked out as carefully as the most intricate piece of machinery. The outside conveyors consist of 200 pockets and run on a curve to the crushers. It is the first time that a conveyor has ever been made to run in a curved line, and therefore this point is of interest and value. Two hundred and fifty buckets on the inside of the building accomplish the work of supplying the bunkers.

The whole system is built of steel and runs with perfect smoothness and regularity, and reflects credit on the manufacturer and inventor, Mr. Charles Berghoefer. The power necessary to accomplish the working of the whole mechanism of the conveyors consists of two Crocker-Wheeler motors of 35 and 50 horsepower respectively.

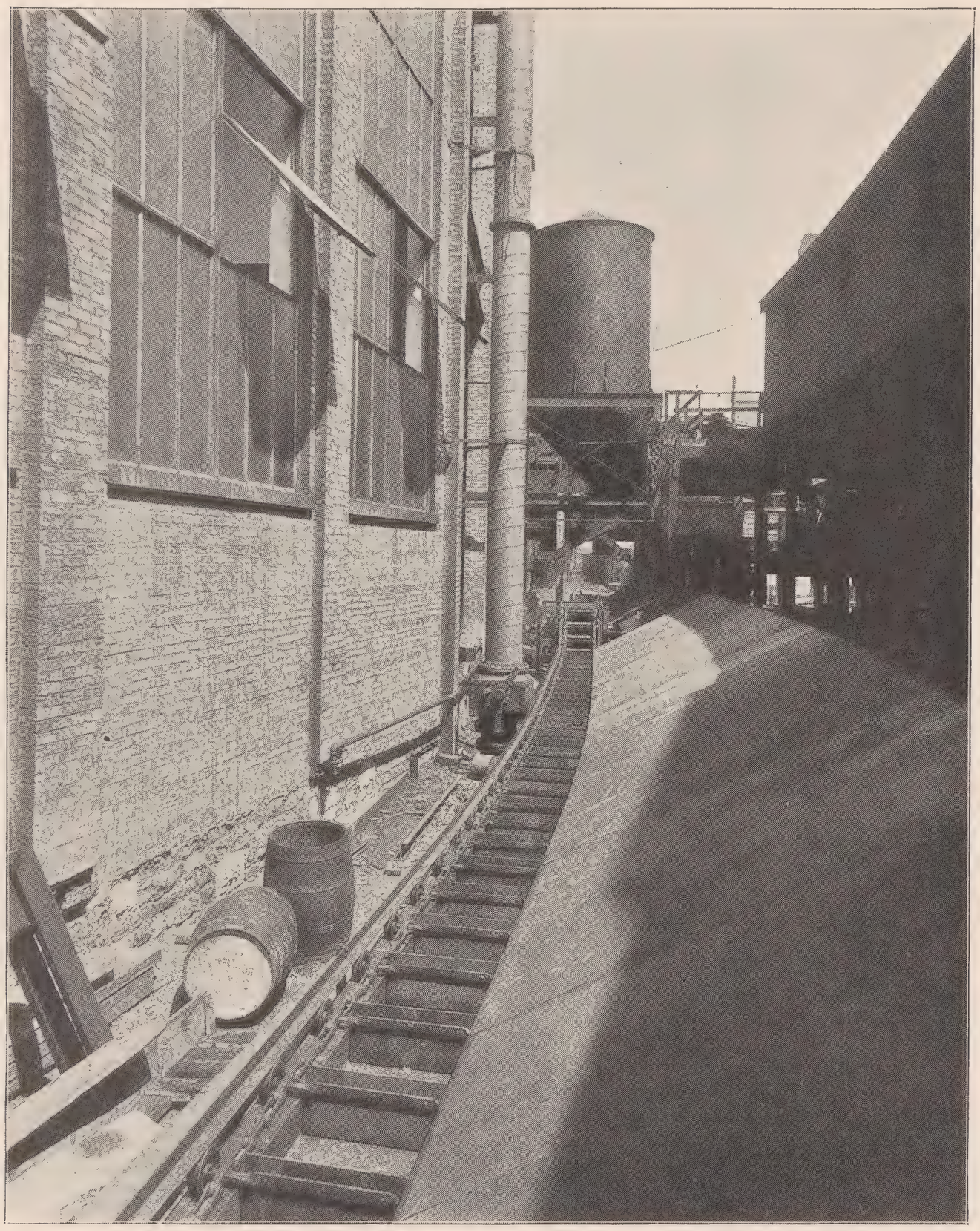
THE FURNACES.

The coal is fed from the overhead bins or hoppers through the down-spouts shown in the illustration onto the top of the furnaces.

The furnaces are the latest improved type of the automatic smokeless furnace built by the Murphy Iron Works, of Detroit, Michigan, of which O. D. Cotton is general sales agent, 1102 Bedford building, Chicago.

From the top of the furnaces, the coal is allowed to fall as needed directly into magazines located on either side and forming a part of each furnace. At the bottom of each magazine is a casting. A part of this is used as a coking plate, the inclined grates resting against it at their upper ends. On the central part of these plates are inverted open boxes with a rack under each end; a shaft worked from the front with pinions geared to each rack moves these boxes backward and forward on the coking plate as rapidly or slowly as may be required by the rate of combustion. The stoker boxes through this movement push the coal from the coking plate on to the grates.

Immediately over the coking plates are the arch plates. Where the fire-brick forming the arch comes in contact with the arch plate, there are ribs that form the skewback on which the arch rests. The spaces between these ribs are air ducts. The grates are inclined from the sides toward the center of the furnace in the form of the letter "V." At the lower end of

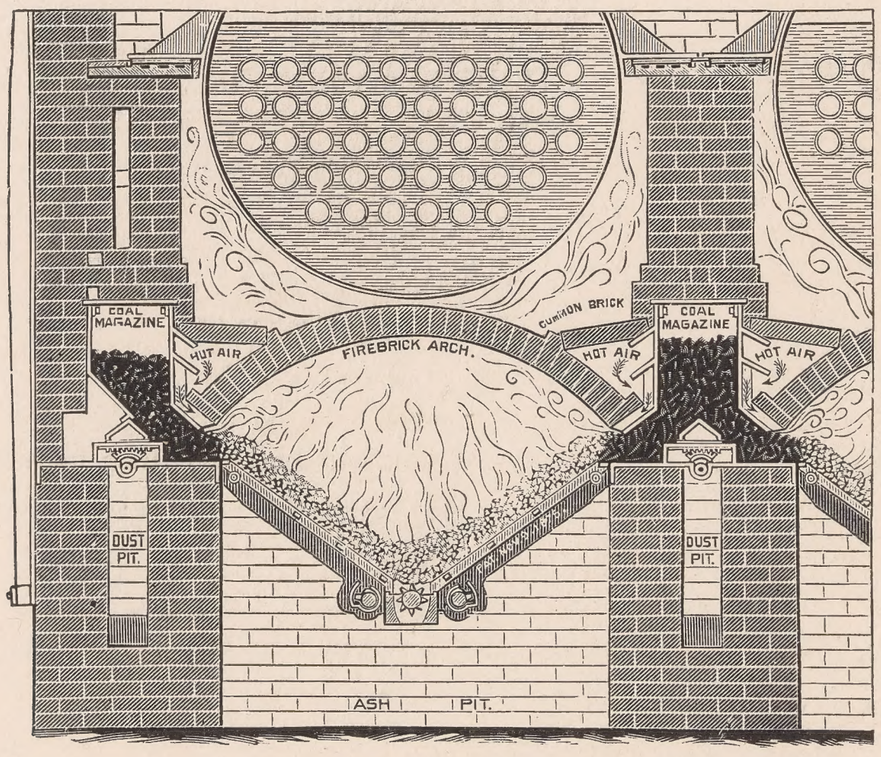


VIEW OF COAL CONVEYOR AND INCLINE ON WHICH COAL CARS UNLOAD—ALSO ASH HOPPER AT TOP OF BUILDING.

the grates there is placed lengthwise of the furnace a toothed shaft or bar called a clinker bar, for removing the refuse from the fire. On each side of this clinker bar and engaging with the lower ends of the grates is a shaft called a rocker bar for imparting movement to the grates.

The stoker boxes, rocker bars and clinker bars are attached by links to a reciprocating bar extending across the outside of the entire front. This bar is actuated by a donkey engine with automatic governor and proper gearing located on the left-hand corner of the front of the furnaces, as shown in the illustration.

The operation of the furnace is extremely simple, the coal being pushed by the stoker boxes over the coking plates on to the upper part of the grate bars. Air is admitted and regulated by a register at the front, passes through flues up over the arch, takes



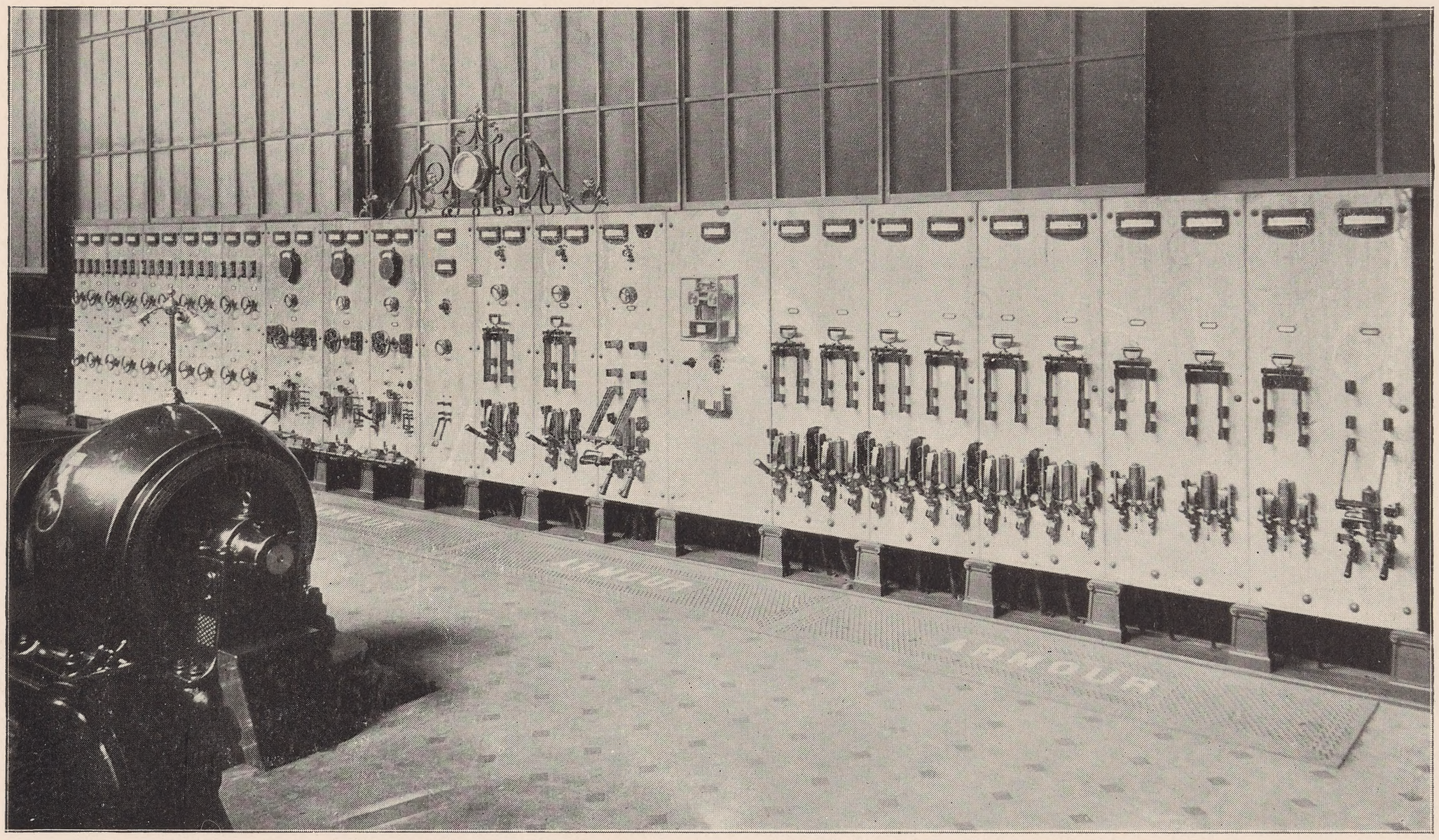
CROSS SECTION, MURPHY AUTOMATIC SMOKELESS FURNACE.

up heat from the front, arch and arch plates, and, passing down through the air ducts, supplies to the coking coal the proper quantity of air at a suitable temperature to produce immediate, complete combustion of all volatile gas.

By this method that part of the coal that usually passes out of the chimney in the form of smoke is utilized and the boiler-heating surfaces are kept clean and free from soot and in condition to absorb the heat supplied. The large coking surface obtained by this construction enables the furnace to feed the coal slowly enough for it to coke completely, and the delivery of air in numerous jets properly distributed so as to quickly permit a mixing of the oxygen with the liberated gases and hot enough to ignite them, consequently no smoke is made.

By the time the coal is fairly on the grates, the gaseous part is consumed and what remains is coke, which is not smoke producing, and is burned in the ordinary manner, getting the needed supply of air through the grates. The grates being constantly in motion, air passes between the bars and keeps them cool, producing a constant clean, live fire.

The incandescent coke moves gradually down toward the center of the furnace as it burns, where the clinker bar breaks and grinds the clinker and refuse and deposits them in the ash pits, from which they drop into cars beneath.



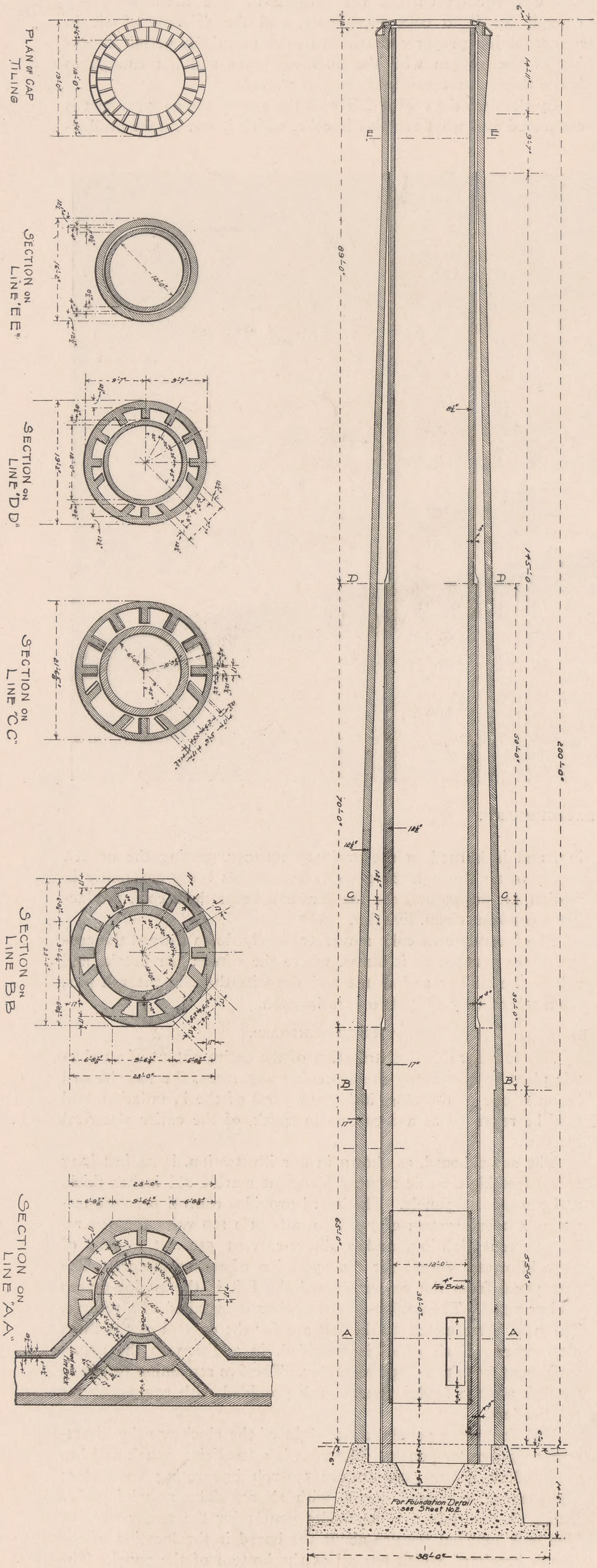
VIEW OF THE SWITCHBOARD.

THE SWITCHBOARD.

As the control and distribution of the entire output of an electric plant is effected by the switching apparatus, the switchboard becomes one of the most important parts of the installation, and may be regarded as a focus, so to speak, of the entire electrical system.

The switchboard, as shown in our illustration, is 44 feet long and 8 feet high, made of gray Vermont marble 2½ inches thick, and contains 18 panels. The board provides control for an alternating-current system of 710 kilowatts at 1,100 volts for general incandescent lighting, and a direct-current 550-volt system of 1,850 kilowatts output for the operation of power motors. The first panel from the center toward the left is the engine-driven exciter panel. The engine-driven exciter is installed as a reserve. The next three panels to the left are for the control of the three alternators. Each panel is provided, in addition to the actual equipment, with a voltage regulator. The five remaining panels to the left are the feeder panels, each provided with equipment for two feeders.

The first three panels to the right of the clock are the direct-current generator panels. The next is a totalizing panel, and has mounted on it one 4,000-ampere 550-volt integrating wattmeter; also one 4,000-ampere meter, with shunt. The remaining five panels on the right are the feeder panels for the motor circuits. The only unusual feature about the board is the location of the circuit breakers, which are all at the bottom of the panel. The engineers who designed the board considered it handier to close the breakers by lifting than by pushing.


PLAN OF CAP TILING
SECTION ON LINE "E E"
SECTION ON LINE "D D"
SECTION ON LINE "C C"
SECTION ON LINE B B
SECTION ON LINE "A A"
For Foundation Detail see Sheet No. 2.

DETAIL PLAN OF STACKS.

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